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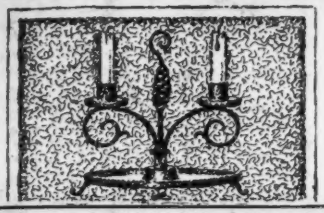
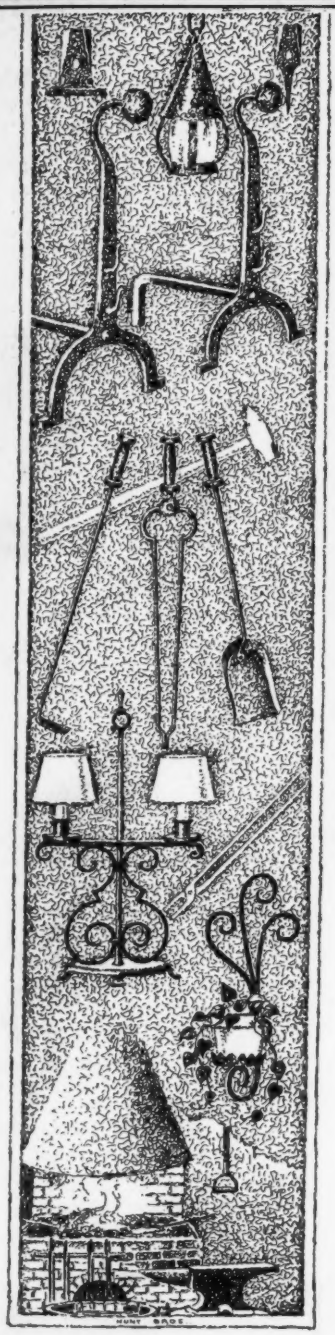
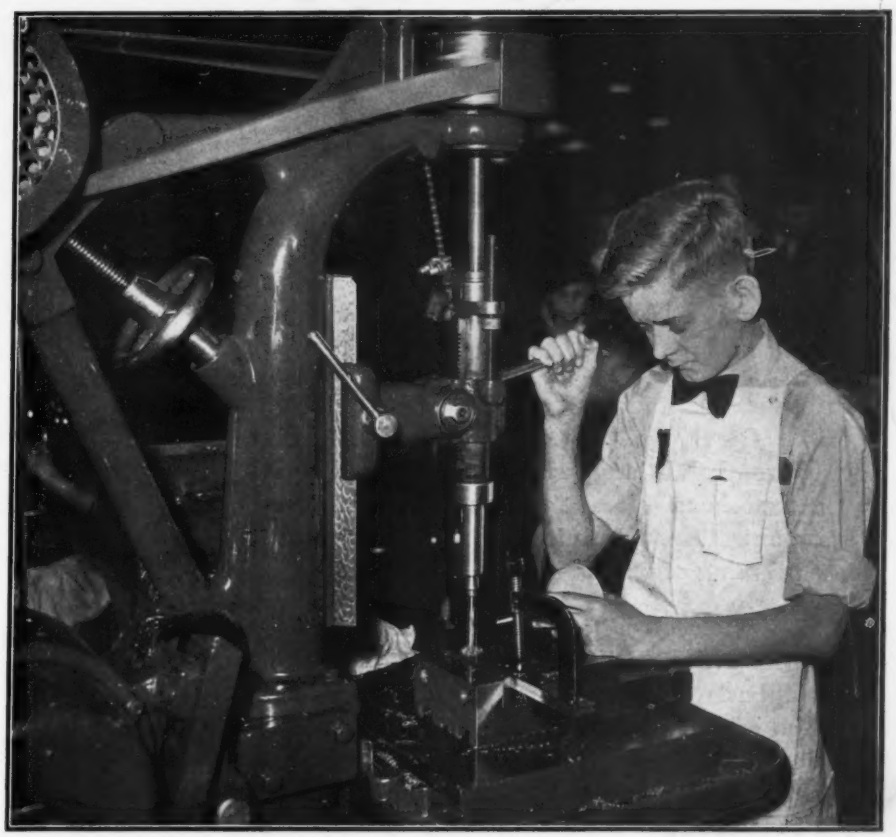


JANUARY 1934

George E. Myers

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION





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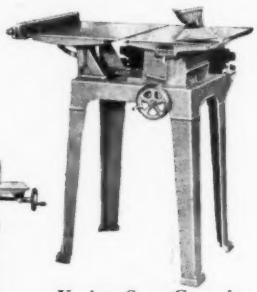

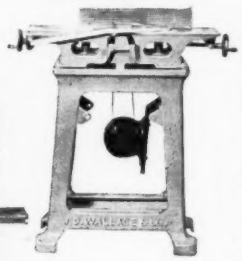

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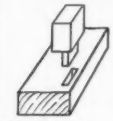
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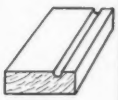
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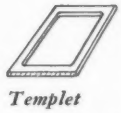
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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

January, 1934
Vol. 23, No. 1

Can Your Pupils Read?

Thomas Diamond

Associate Professor Vocational Education, University of Michigan, Ann Arbor, Michigan

While the study presented is too limited to be accepted as a scientific effort to settle the matter, nevertheless it shows a tendency which needs study and correction.

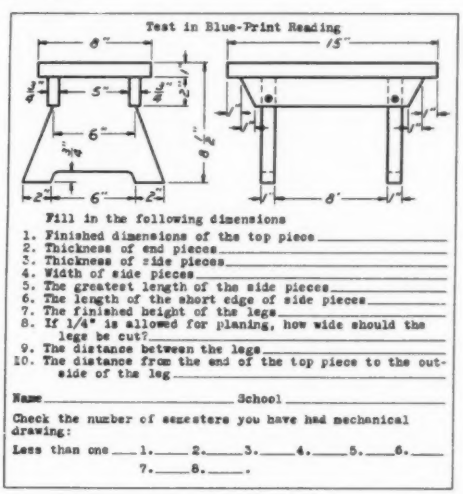
IT IS believed that one of the functions of a teacher in the field of industrial arts is to develop the ability of his pupils to use the necessary common tools with which the craftsman does his work. In general, the teacher performs this function satisfactorily in proportion to the interest and ability of his pupils. We have found, however, that, in many cases, those responsible for this work have failed to realize that the sketch or blue print is a tool which is just as necessary in many trades as the rule, the scale, or the micrometer.

If a boy in the machine shop is unable to read his micrometer his teacher does not hesitate to assume the responsibility for teaching him. It is true also, that if a pupil in a carpentry class lacks the ability to use a steel square when he is confronted with the problem of laying out a jack rafter his teacher considers it his duty to instruct him. However, when the same pupil cannot find the necessary sizes on his blue print the teacher is likely to tell him. Not only does he tell him the first size needed but he continues to dictate the sizes as the pupil proceeds with the job. If he thinks about it at all the probability is that he is berating the teacher of drawing because the work of the drawing department does not function in the shop.

It is not the purpose of this article to attempt to place the responsibility for teaching the young worker to use effectively this most common of all tools, but it is believed that the data which follows should be accepted as evidence that someone should concern himself with the task.

The study, from which the following data were secured, was too limited in its scope to be accepted as a scientific effort to settle the matter. It is felt, however, that the results indicate a distinct need for more reflection on the part of teachers on the following two questions: First, "Should our pupils in industrial-arts classes be able to read the drawings from which they work?" and second, "To what extent is the shop teacher responsible for developing this ability?"

In order that we might discover the extent to which pupils could read drawings, a simple three-view sketch of a stool was prepared, and distributed to eleven high schools in nine different cities. Ten simple questions were selected and submitted with the sketch. These questions were based entirely upon information which the pupil would have to get somewhere or somehow if he intended making the article represented. Every effort was made to confine the questions to simple matters in order to avoid confusion in the minds of the boys.



Test in Blue-Print Reading

Fill in the following dimensions

1. Finished dimensions of the top piece _____
2. Thickness of end pieces _____
3. Thickness of side pieces _____
4. Width of side pieces _____
5. The greatest length of the side pieces _____
6. The length of the short edge of side pieces _____
7. The finished height of the legs _____
8. If 1/4" is allowed for planing, how wide should the legs be cut? _____
9. The distance between the legs _____
10. The distance from the end of the top piece to the outside of the leg _____

Name _____ School _____

Check the number of semesters you have had mechanical drawing:

Less than one ____ 1. ____ 2. ____ 3. ____ 4. ____ 5. ____ 6. ____ 7. ____ 8. ____.

It was made clear that those responsible for the inquiry were not interested in comparing schools, cities, or teachers; hence, the names of schools or teachers did not appear in the returns. The director in each city was asked to apply the test in person and it was suggested that he confine it to the eighth grade. This last request was made in order that we might feel reasonably sure that most of the pupils tested would have had some experience in shopwork.

An objection to the test was made by some on the ground that the object represented was taken from the field of woodworking. It is believed that the simplicity of the sketch, along with the fact that the drawing conventions used are those which are in common use in other fields, invalidates this criticism.

After the test had been given to the pupils a criticism of question number ten was received from three cities which was accepted as evidence that there was some ambiguity about it. For this reason question number ten was not considered when the tabulations were made.

Table 1, which follows, shows the results from each school, the schools being indicated by letters. It will be noted that 251 pupils replied from ten schools. These schools are located in eight different cities in Michigan, outside of Detroit. The groups varied in size from 8 to 59, the average being 25.1.

Table 1
Students who took the test, distributed by schools and by the number of errors made

Schools	Number of Errors										Total No. of Students
	0	1	2	3	4	5	6	7	8	9	10	
A			1	1				3	1	2		8
B		3	1	3	2	3	6	5		1		24
C	2	6	4	2	2	3	3	1		2		25
D	2	4		3	1	3	1	0	1	2		17
E	2	5	3	9	8	4	4	7	5	12		59
F	1	14	9	2			1	2				29
G	3		3	4	5	5	4	1	1	1		27
H	3	4	4	2	4	1		1	2			21
I	8	6	3	3	4	1	1	1	2			29
J	2	2	1	2	1	2	1	1				12
Totals	23	44	29	31	27	22	21	22	12	20		251

Since question ten was eliminated for a reason presented above, the maximum number of errors possible was nine. On this basis it is of interest to note that almost as many pupils had 100 per cent wrong as had the same percentage right. It is interesting to find also that there were two schools in which no one made a perfect score and that one of these was the school in which the teacher had the smallest group in his class.

Table 2
Students from all schools arranged according to the number of errors made

	Number of Errors											
	0	1	2	3	4	5	6	7	8	9	10	Total
Number of Students	23	44	29	31	27	22	21	22	12	20		251
Students divided into three groups	67		130					54				
Per cent in each group	26.7%		51.8%					21.5%				

While it is disturbing to find that in only one case did a class have as many as eight perfect scores, it is just as disturbing to find that there were only four schools which did not have at least one pupil with nine errors.

The general distribution shown in Table 2 has been brought together into more compact groups in Table 2. In this table three divisions have been made, corresponding roughly to the two quartiles and the middle 50 per cent. It may be seen from the data presented, and from this approximate division, that those in the upper quartile had one mistake or less while those in the lower quartile had seven mistakes or more.

Table 3
Students who had two semesters or more of drawing grouped according to the number of errors made

	Number of Errors											
	0	1	2	3	4	5	6	7	8	9	10	Total
Number of Students with 2 semesters of drawing or more	6	5	2	7	6	6	5	1	1	4		43
Students divided into three groups	11			26				6				
Per cent in each group	25.6%			60.4%				14%				

It was felt that the question of the effect of experience in drawing on the ability to read should be of interest. With the idea of gaining some light on this question, each student was asked to indicate the number of semesters he had had in mechanical drawing. Those who had two semesters or more were segregated and a separate statement of their reaction was prepared. This compilation is shown in Table 3. It may be seen from this table that the difference between those who had two semesters of drawing or more and those who had fewer than two semesters was very slight. The difference in the upper quartile was less than 1 per cent while that in the lower quartile was only 8 per cent. In other words, the only change which seems to have been brought about by the pupils being exposed to two semesters of instruction in drawing is that there has been a slight pulling together of those in the upper and lower quartiles toward the middle 50 per cent.

This evidence is entirely too meager to use as a basis for the assumption that students who are learning to make drawings do not learn to read them. However, it is believed that it should stimulate thought on the part of drawing teachers and it should cause them to reflect on the whole question of their objectives.

Regardless of our opinions concerning the individual responsible for the situation revealed in the data shown above it is believed that everyone will concede that there is considerable room for improvement. The function of this study was to discover if possible, how well the pupils could use the blue prints from which they worked and not to suggest how conditions might be improved. In spite of this it is believed that every teacher in the field of industrial arts should concentrate on the problem of preparing his pupils for more intelligent use of the tool which is common to most of our trades. If this is to be done, both shop and drawing teachers must set aside definite periods for drill. These periods need not exceed ten or fifteen minutes but they should be regular. If these drills are continued the work done in the drawing room will be done more intelligently and the work in the shop will proceed with greater speed and accuracy.

Beliefs About Industrial Arts*

Homer J. Smith

Professor of Industrial Education,
University of Minnesota, Minneapolis, Minnesota

A timely, thought-provoking talk given to industrial-arts teachers by an authority who prepares teachers for the fields of industrial-arts and vocational education.

I AM glad to be back in Milwaukee, of course, and it is complimentary to be asked to express my beliefs on the problems dealt with by you in state-wide conferences and at your annual meeting. I have not prepared an address, but, rather, a comprehensive talk. I was given the opportunity, if I read the correspondence rightly, to think clear across the field of industrial-arts education and to express beliefs on numerous matters, such as objectives, curriculum, courses of study, and methods. I came here with the feeling that "We ain't lit yet" in this industrial-arts business, but in the certain knowledge that we are closer to where we hope to be each year in our objectives and particularly in our course materials. We have not done so well, I think, in methods and other related matters.

I have made two notes at the top of the outline which is in your hands. I would like to have you keep these two things in mind. One is a protection for me and the other probably leads me into trouble. *First*, I work in both phases of industrial education, industrial arts and trade education as well. You have to know Minnesota to appreciate how that could be possible. (Wisconsin is spoken of, nation-wide or the world over, as a dual state in which these two fields are more or less distinct.) In Minnesota we try to handle the two together in every possible way, so our state supervisors are supervisors of industrial arts and trade education and our teacher-training department prepares workers for both fields. Now, naturally, one does not believe the same things with reference to both of these fields. The fact that we in Minnesota believe that they should be unified in their administration and supervision does not mean that we believe that the methods of one are applicable to the other or that the materials of one are appropriate for the other. Sometimes, in a mixed group such as this, one is talking about industrial arts and his listener is thinking in terms of trade education, which circumstance puts the speaker in a bad situation. If we would have a thorough understanding today, what I say must be accepted as referring to *industrial arts* and not to *trade education*. Our topic is "Some Beliefs Concerning the Industrial Arts."

Second, we are to have discussion or questions at the close. I think this period need not be confined, necessarily, to things I have said nor to what is listed in the outline. I'll be perfectly willing to answer, if I can, any question that you may have. That is a big order, but I cannot promise to be correct or satisfactory.

Objectives

I want to pass quickly over the matter of general or departmental objectives. You will find here at the table some mimeographed materials on this subject. Furthermore, just before leaving home, I received a publication concerning objectives from Prof. William L. Hunter, of Ames, Iowa. He has put out a fine bulletin, in mimeographed form about an inch thick, which may be had for 50 cents a copy, postpaid. It is a fine piece of work on our objectives. It is not a discussion but a verbatim report of what our special literature holds, with definite references.

The objectives of our work must be different at the different levels of our school system. We have elementary schools, junior high schools, senior high schools, etc., all of which give some attention to the industrial arts, but for different reasons. We would not have all these different school units unless they had different purposes, and in any one of these units we would not have all of the departments and subjects unless they had different purposes. Each department in any one of these schools is expected to make a contribution more or less distinguished from that made by other divisions. Every industrial-arts teacher should be ready to state the objectives of his school, of the industrial-arts department within it, and of the particular subject for which he is responsible.

I have tried in my classes numerous times to have teachers say something for their individual subjects that can't be said for any other subject in the department. I am frank to tell you that they can't do it. Now, we hardly deserve our places unless we can do it. If these subjects all make the same contribution, what is the use of having all of them? If wood does not do something to a boy that printing can't do, then let us have either wood or printing, whichever is cheaper. If we are to have five or six subjects in the junior school or twenty in the senior school, let us have subjects for which we can build logical cases. Each one of us thinks his subject is a little more important than the others, that it does something to a boy or for a boy that none of the other subjects will do. But, if you try to put it on paper; just sit down and write it out! (This matter is reserved for the discussion period.)

Offering and Sequence

If industrial arts has a function to perform, and we have made up our minds what it is, then we need some subjects with which to do it. In Minnesota, there is a wide scattering of the number of our industrial subjects and a considerable difference as to what these subjects are. I believe a junior high school should have six industrial subjects, one for each semester, and am opposed to the short-unit courses of six or eight or ten weeks' length. I can't get my objectives attained in less time than a semester. The informational and guidance element are too important. The six subjects we choose should be possible in a small town as well as in a large city, just as applicable in Milwaukee as in Wauwatosa or South Milwaukee, and just as useful in London as in Minneapolis.

If industrial arts is a part of general education, used to acquaint young people with the world of work, the same subjects can be employed anywhere. The industrial-arts group is not necessarily a selective one. In the most progressive school systems it comprises all boys of certain grades and slopes off by election after the compulsory span. In other systems, under free choice, there is a tendency for the group reporting for industrial courses to be inferior in general intelligence to those who avoid them. We must work toward the defeat of any degree of such selection; we must strive for a thorough cross section or for 100 per cent enrollment, each boy for at least a brief contact. Our slogan may well be — *Industrial arts for every American boy and trade training for carefully selected boys in the number that can be placed.* Everyone should have some knowledge of the processes, the working conditions, and the employment possibilities of our society. One's education is not complete in these days without some understanding of the history and trends of manufacture and exchange. So many people are either directly concerned or so clearly affected that industrial education and information become a necessity.

If we were to offer six subjects in the junior high school, I should say that they all ought to be compulsory for every boy. He should take industrial arts throughout the junior school, maybe one period a day rather than two, and every day if possible. He should change five times; that is, get six different subjects in the six semesters. I can't find anything in the literature, at least anything objective, as to what the order of these subjects should be. I don't think we know anything about the order or sequence in which these subjects may best be given. The main point is that each boy should experience all of them.

*Abstract of an address before the Wisconsin Industrial Arts Association. Milwaukee, Wis., November 2, 1933.

When we pass from the junior to the senior high school, I believe that we should offer as many units or subjects in the department as we can get the community to finance. We look upon the senior school as a preparatory school, preparing some for college and a much larger number in these days for immediate entrance to the world's work. If one of these boys has a right during his high-school experience to a training for his next step, which is up into college, then his brother or cousin or friend has the same right, in the same building, with the same funds, to preparation for his next step, which is out to work and probably in industry.

We would seem to have need in the beginning years for identically named courses. These should be well chosen to present the geography, the transportation, the manufacture, and the ultimate uses of certain raw materials. They need to be the best few subjects with which to picture broad classes of industrial occupations and the highly variable conditions under which industrial work must be done. The chief aims at this level are physical coördination, industrial intelligence, and a start in the direction of occupational choice. At the senior-high-school or junior-college level there should be more difference of offering, more latitude of choice, and more intensity of treatment. The courses should be elective rather than compulsory as in the junior schools. Students should elect whether they will take any, which ones they will take, when they will take them, and whether they will take them in scatter or in pile-up or continuance. Some of these courses should afford specific preparation for engineering or for industrial teaching; others should be vocational in character and should lead to placement in the community. I see no need for matching the local community in the junior school, but great need for doing so in the senior school and the junior college.

Kinds of Shops

I believe in individual shops wherever they can be financed. I believe in the general shop as something to provide when you can't have individual rooms and equipment. This leads to the question of home mechanics. In our state we find high-school principals and superintendents enthusiastic about something called "home mechanics." I have two beliefs; one is that most of the courses that I have seen (or textbooks or sets of instruction sheets) would not go twenty per cent home jobs. If a home-mechanics course means anything, it means the training of boys to do jobs at home that have to be done there. I don't think we are ready for the supervision of home jobs at the level in the school system where we usually put the home-mechanics course. In the second place, it is usually in home mechanics that we ask students to use a variety of materials, a variety of equipment, and a variety of skills at just the time when they have little understanding of any one of the fields represented. If I were going to put a home-mechanics course anywhere in school, it would be at the end of the curriculum, probably the last elective course before graduation. After I knew that a student understood something about electricity, sheet-metal work, woodwork, and the rest, I would feel content to see these mixed in special projects.

Materials and Organization

Dropping in upon a teacher at work, I find him busy, of course, and he is respectful enough to come over and say "How do you do?" I usually say, "Go ahead with your work; don't pay any attention to me; I am not a supervisor; I just dropped in; but I wonder if I may see your course of study." Then there is a change of expression, sometimes a frank admission that there isn't any, sometimes a tolling off on the fingers of what things the boys are to make. Often, if there is any course of study at all, it is in his mind, as a succession of projects and jobs. It is not in typewritten or printed form. This does not signify, necessarily, that he does not teach a good course; it means that he is thinking in terms of physical product.

I believe that every teacher should have a course of study whether he makes it himself, works it out in committee, or has it handed down to him. I believe this course of study should be in terms of teaching units, not of things to be made or done. I want the main body of the course outlined in terms of what the teacher is going to teach, what the boys are supposed to learn. The left-hand side of the chart should show learning units and the right side should show the tools, materials, projects, jobs, references, etc.

Our job as industrial-arts teachers is largely an informational one. We are not obligated to duplicate the processes of factories and other workplaces, but merely to sample them and to explain them. We are not attempting to produce craftsmen. We are hoping rather to give boys those experiences and informations that are useful in average living and in any calling. We offer instruction to boys who will become lawyers, farmers, dentists, and storekeepers as well as industrial workmen. We expect to interest, to inform, to inspire and to guide. We bring still other subjects into the school life of the boy to play their parts in his development.

I feel certain that we are spending an undue portion of class time in manipulation. Likewise we are prone to neglect the histories of occupations, the qualifications of workers, and the practical conditions of employment. We are failing to realize full exploratory values because we omit or slight the knowledge elements for the sake of getting things done. We need to look upon our courses as sciences and upon our shops and drafting rooms as laboratories.

Management and Generalship

All of you know that a year or a day passes quickly and is full of interest, quite in relation to the goodness of your management. If you are a person who does not have a good management sense, who does not have a place for everything and a time for everything, sometimes the whole matter gets out of hand and you go home more or less dissatisfied with what you have done or what the boys have accomplished. I need not argue before a group of employed teachers that a good management scheme is half the battle and that it involves generalship. *Generalship* is not quite the word because it smacks of war and military life, and that is not what I mean. We don't put enough gap between us and our pupils. I don't want an industrial teacher to be austere, to be hard-boiled and a driver; but I don't want him to work all of the time with his students. A person calling at an industrial-arts department ought to be able to tell which one of the group is the instructor. Why an industrial teacher thinks it is his job to hurry to school in the morning, get into a jumper, and rub sawdust into his hair is more than I can understand. I think we can build up more respect in our students by doing things once in a while that are too difficult for them to do or by showing them something in some new way, rather than by keeping ourselves eternally busy doing a part of everything in which they are engaged. It seems to me, that even with our hearts full of good fellowship for them, with the closest possible sympathy and desire to help, we can still maintain a gap that anybody can see and that they will appreciate perhaps more than we imagine.

There is no law or rule, as far as I know, to the effect that boys should enter a shop and go right to work. There ought to be a rule that they invariably seat themselves before the instructor to find out what he may have planned to tell them or show them or ask them. Boys should not approach a class period with the feeling that the time is theirs for the advancement of their projects, nor look askance at the instructor when he claims a portion of the hour. They should understand that skill and product are incidental at this level and that the primary elements of the course call more for brain than brawn. Boys are not there to work; they are there to learn, and manipulation alone will not insure a proper return on the space and time and money that is allotted.

Part of each week or even of each class hour should be given to group work of a really informative kind. There should be textbooks and recitations and assigned readings and some homework and perhaps notebooks and certainly examinations, and once in a while a failure in this subject, as well as in other subjects. There should be field trips on schedule, not many perhaps, to manufacturing plants, stores, buildings in construction, road-making sites, and wherever else people may be seen at work. A considerable amount of information must be imparted about basic raw materials, their places of origin, their natural states, their working properties, and their finished uses. By this means boys become better acquainted with their environment and have a better notion of what men do. They draw a little closer to a proper occupational selection because they discover whether they have abilities and interests in the mechanical field. Active boys want to make things and fix things, of course, but there are other places where they can extend their practice upon their own free time. Any industrial teacher who assumes that boys can learn about industry through hand and machine work alone, does not know what industry means. If, in addition, he assumes that there is nothing that can be learned except in his presence, then we may say that he probably is not a teacher.

Method

I have been trying to preach a philosophy of change or variety. One article which appeared in the December, 1932, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was entitled "Variety in Class Conduct." I believe that a boy or a teacher should be en-

gaged in different types of activity from day to day or from week to week. I can't think of anything more boring than going to a class every day and knowing beforehand just exactly what is going to happen. A good industrial teacher, like any other good teacher, should have a dozen arrows in his quiver.

Some industrial teachers single out one method and rarely use any other. In some schools the instruction-sheet plan is practically the only one in vogue. The whole idea seems to be to give a student one sheet and then to give him another. I look upon instruction sheets as just one more device, just one more instrument in the hands of teachers. They should be used for certain purposes and not permitted to break that close, constant, personal connection that should exist between a teacher and his boys.

Please don't believe that I see no good in these sheets. I think there are spots in every course that can be taught better by this method than by any other. Some things, on the contrary, cannot be taught by their use. The instruction sheets are just one more device and means for a teacher to use at his discretion. The wholehearted acceptance of the fact of individual differences does not force a teacher to a method or plan wholly or strongly individual. The belief that students differ is not logically followed by instructing them all alike, even though individually. The first-class industrial-arts teacher, to my mind, is one who is committed to and trained for group presentations and who knows enough about the individual method to supplement his group attempts. He knows how to make use of the textbook plan, how to lecture, and how to demonstrate. He knows how to deal with a whole class, or part of it, or one lone member of it. He knows how to assign library and homework and how to conduct a recitation. In short, he is skillful in several types of teaching and possesses ability in the fields of discipline, departmental management, and whole-school helpfulness.

Product

In the upper grades and junior period, we may employ rather standard operations, exercises, projects, jobs, and problems. There are certain fundamental skills, informations, appreciations, and attitudes which we want all boys to acquire and which can be embodied in and built around some few selected assignments. There must be, of course, some matching of individual and immediate interests; but, on the whole, the instruction may well go forward on the same lines for all. For older boys, with these elementary things attained, we must turn to other motives and use other methods and means. The work must be planned to teach the use of jigs, the duplication of parts, the routing of work in process, the likelihood of accidents, the monotony of specialization, the economy of materials, and the value of time.

We admit there must continue to be much individual work upon simple, single projects, but we insist likewise that there must also be some combination projects, some easy production jobs, and some coöperative assignments. There must be an opportunity for student foremanship and any other device for building responsibility. There must be coördination among industrial subjects, correlation with clearly academic branches, and assistance in the extracurricular load of the school.

Now I would like to say just one word more about the demonstration. In our state we are trying to develop interest in a rather extended demonstration, not extended in point of time, but in point of purpose. All of you, I think, regard the demonstration as one of the best teaching devices that we have. It is current; it is almost universal in practice; practically every industrial teacher uses it as one of his means of presentation. I believe that not more than twenty per cent of us ever use it for any other purpose than to demonstrate what we expect the student to do; that is, we use our demonstrations in order to teach what we expect students immediately to attempt. That is all right, but it does not go far enough.

We are trying to get our young men to give two kinds of demonstrations: to demonstrate some of the things that they expect the students to do and then to demonstrate rather frequently things more advanced in the field, that the students won't come anywhere near doing before completion of the courses. We are trying to get our teachers to put on demonstrations of accurate, rapid, careful work that students rarely see. We want frequent demonstrations of what they expect boys to do and occasional demonstrations of their own superiority and of the skill margins which they possess.

Discussion

Q.: You made a statement that at a certain period, as in the seventh or eighth grade, you were in favor of teaching certain things to all boys. If I understood you rightly, you also said that you would practically disregard the student's interest.

A.: No, I did not say quite that. I said that there must be some recognition of immediate interests and even of seasonal interests, but that I would not put myself in the position of letting a lot of little boys dictate my course. I think we have to be rather definite as to what seventh-grade woodwork is, as to what eighth-grade sheet-metal work is, etc., and then permit some little variation in the selection and design of our projects.

Q.: One thing bothered me in respect to the length of our periods. Would you extend that one-hour period into the senior high school or have more time in the upper years where the boy has elected this kind of work, has a vocational interest in it, and wants the time to actually learn and get more specific skills?

A.: I think circumstances and groups must determine. In the high school, whole half-days are feasible for certain classes. The one-period length is going to be distinctly to our advantage, when it gets going, for two reasons. It will help some teachers to have their students before them every day, rather than two or three days each week; furthermore, we won't longer have to make our decisions upon the basis of what home economics and commercial education groups desire to do.

Q.: Are there not some subjects that make it advantageous to use the double periods because of the set-up of machines, etc.?

A.: Every teacher who is used to a double period will try to find some reason for retaining this plan. The only reason we ever had two periods is because we got them, and we like them because we are accustomed to them. We must change our methods a little. It is just like saying that we can't teach more than fifteen students at a time because, early in the work, they split a class of thirty boys and girls and sent half to home economics. The point is, we will be required to handle more and more, perhaps fifty at a time. All we can do is experiment and change our methods accordingly.

Q.: You would still make it compulsory in the junior-high-school system?

A.: I would set up six subjects and then I'd say, "Every boy who completes these will be through with industrial arts except by election. If he wants to take more, all right; if he wishes to stay in one shop or to scatter his work, all right."

Q.: Will you give us the names of the six subjects you mention?

A.: In the first place, I would use the word *general* with most of them.

1. *General Wood.* I would not think of that quite in terms of a course in elementary benchwork. My idea of general wood would be to acquaint boys with wood, how it is grown and worked, its characteristics, occupations, etc. I would demonstrate the making of a pattern for example and let them know what cabinetmaking is. Everything about wood in the raw, wood as it is transported, wood as it takes stains and finishes, names and types of work that men do in the field of wood, skills in wood.

2. *General Drawing.* You don't have to call it that if you don't want to, but it would not be the making of half a dozen or 24 plates for technique. Get them acquainted with the idea of drawing, the use of drawing in work, and different types of people who work at it. Teach them about architectural drawing, pattern drafting, map drawing, commercial design, and any other kind — an acquaintance with drawing.

3. *General Electricity.* I'd put electricity in my set of six subjects because I don't think that we can avoid it if we are to picture the work-world. It is in the boy's environment, just as apt to stay as wood; it certainly borders on the scientific as wood does not until you get into finishing and the physical characteristics of the machines. It is a different thing; it helps a different type of boy; it makes a new interest. You can say a lot of things for electricity that you can't say for wood or drawing. It is different and deserves a place.

4. *General Metal.* Now we get to metal and I want you to put down "general" — not sheet metal, nor wrought iron, nor machine shop. Here is a medium which comes from a different place; it is found in a different condition; you do a different thing to it before you make it useful; it is worked by a wholly different set of instruments, tools, and machines. It serves a special purpose in the world; it is in the environment and it is varied as tin, copper, galvanized iron, etc. Teach them about the different people working in metal, the grades and types of employment, the prices, how metal is displacing some other materials. Then, if

they come to the senior high school and elect to learn more of metal, let them have it as sheet metal, machine shop, and other special courses.

5. *Printing or Duplicating.* We must include in our set of elementary courses something about printing, if you would call it that. I want mimeograph, hectograph, ditto, typewriting, printing, photography, anything that we use in making duplicate copies. These do not all need to be done from the standpoint of skill but we must remember that printing does not mean showing boys how to set matter and how to feed a press.

6. *Power or Gas Engines.* Now, the last one of the six junior-high-school subjects is some kind of power or engines — steam, water, gas — all kinds of power. Here is a thing we have not represented anywhere else; it is a thing with which the boy is surrounded; it is a permanent and important thing. Whatever you do, don't call it automobile mechanics and put a lot of engines on blocks for study or bring in a car for tinkering. That may be all right in the senior high schools or trade schools, but not in the junior high school where you are trying to make a boy world-wise, where you are trying to help him select the thing to do. Bring his attention, not to gas engines alone but to all kinds of devices that are known to the power field.

Q.: I assume now that if a person learns about wood, drawing, electricity, metal, duplicating, and power engines that he is then ready to select wisely when he gets to his senior-high-school year.

A.: Well, you could not say that a boy has seen the whole field, he would have seen just six; but you can say that these six experiences are better to enable him to picture the world of work than what we commonly offer. It is more a matter of the *general* content of the courses and the aim of explaining work life.

Q.: If a person is to learn something in wood, you think it is well to teach him the use of the chisel, the hammer, the saw, the file, and a few other things first?

A.: He must be made acquainted more or less with a few common tools represented in these different courses. I don't mean to take the processes and products out of the shop; we can't rob boys of these experiences. But, we have depended too much on projects and jobs in these early grades and not enough on picturing work fields and work conditions.

Wood Carving—II

J. I. Sowers

Director of Vocational Education, Miami, Florida

The second in a series of articles adapting the art of wood carving to industrial-arts work.

FOR many years wood carving was almost a lost art, at least in this country. We have been slow in recovering from the jig-saw work of the Rutherford B. Hays period in American life. The return to an interest in the art of the carver represents one of those familiar swings of the pendulum which continually are bringing back into the present segments of the past. That there is a definite trend toward a reproduction of the fine old carvings of the past, there can be little doubt. Within the past few months, several newspaper advertisements for wood carvers have appeared. One of the largest public buildings in the south, recently erected, is decorated by hand carving in its interior finish and furnishings, the work being done by artisans right on the ground. Of course, our best furniture makers in Grand Rapids and other centers are supplying us with machine carving, but even in this, much of the final and finishing work is done by hand by persons skilled in the art of carving.

In this article an attempt is being made to treat of a more extensive type of wood carving, which is still easy enough to be within the ability range of the average boy. In this work the design is simply cut into the wood, without attempting to produce any background for bringing the work into relief. Most of this work is done with the gouge. Three gouges, ⅛ in., ¼ in., and ⅜ in., will be sufficient for the work shown in this article.

The work is so simple that it needs but little explanation. Figure 5 illustrates the method of holding the gouge, and also shows a design in process of being cut. The student will need to get used to cutting the different kinds of wood, and in meeting the conditions set up by variations in the grain of the wood. This will come from practice. One hand furnishes the motive power to the tool and the other restrains, controls, and guides it. Several practice pieces ought to be worked out before attempting to work on a piece to be used for production. This type of work is really another form in *incising* and is so called in some texts on this subject; however, an old German text published in 1808 calls this form of carving *chasing*. In order to prevent confusion with the work described in a former article, we shall call this work *chasing*, throughout this series on carving.

The book ends, No. 2, and the library table, No. 7, in Figure 6 are examples of this type of work. No. 1 in Figure 6 illustrates a form of gouge work where a portion of the surface is gouged out with a small gouge giving a rough, rugged appearance which is sometimes very pleasing, especially on small articles. This form of carving is used again in No. 6, Figure 6, in connection with both chasing and incising. No. 3 in Figure 6 illustrates chip carving, which is the oldest

Fig. 5. Showing position of hands in using the gouge for chase carving.

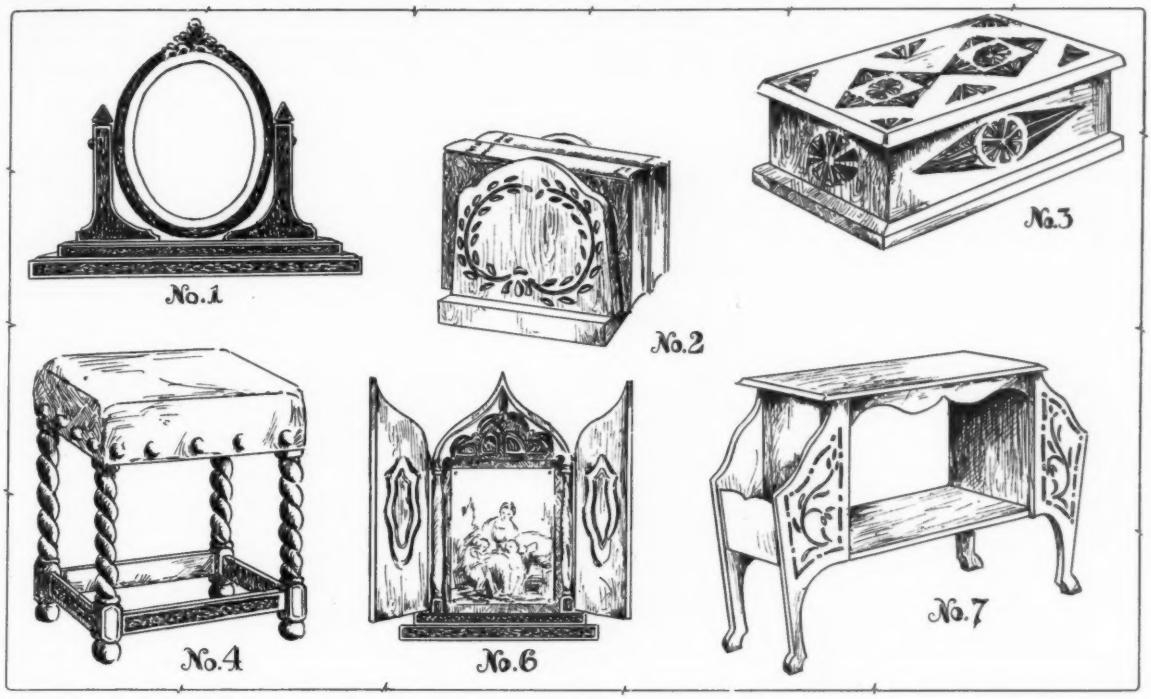


Fig. 6. Showing examples of simple carving as applied to various projects suitable for industrial-arts work.

form of carving, being barbaric in its origin. This is shown here since it is quite closely akin to the work we have discussed in this and the previous article. Chip carving is done with the knife shown at B in Figure 3 in the article on this subject in the November issue. It will be noted that two layouts for chip carving are shown in Figure 7. All the other designs in Figure 7 are intended to be executed by chasing. A sufficient number of designs are given to be suggestive for use on different articles. The designs, of course, must be adapted in size, shape, and layout to the space to be filled.

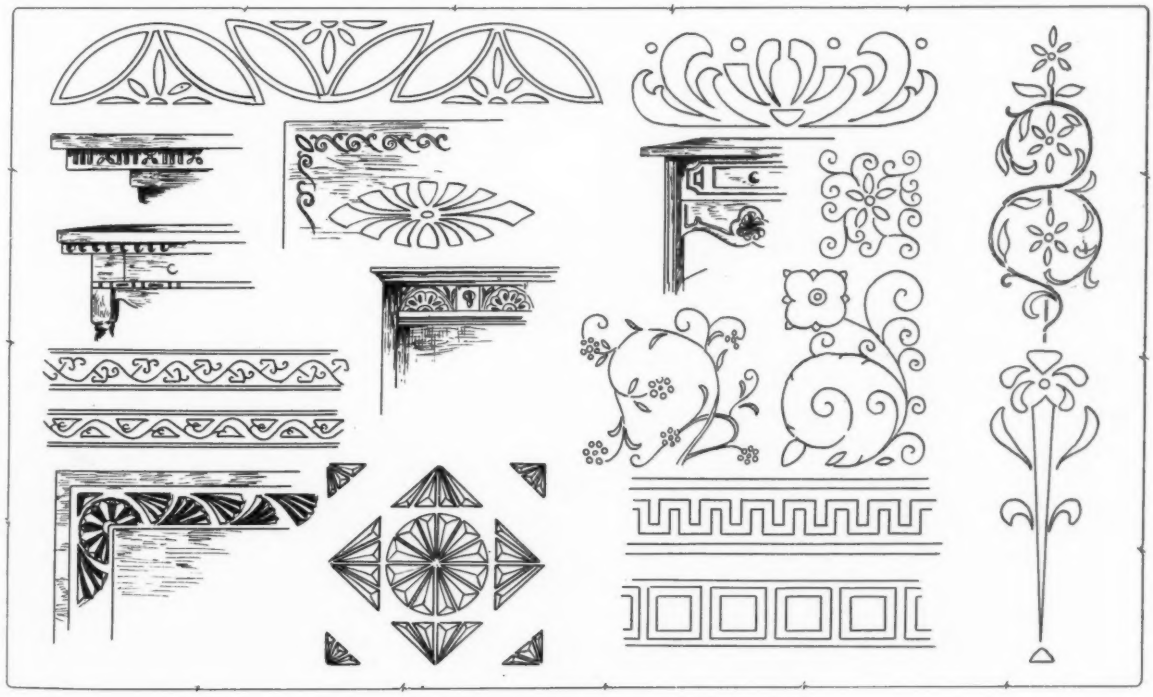


Fig. 7. Designs suitable for chasing and chip carving.

Cutting Spirals

The stool shown at 4 in Figure 6 is a Jacobean period piece, 18 in. high by 14 in. wide. It is shown here to introduce spiral cutting, which is a quite necessary accomplishment to one who would do much carving work in the period styles. Figure 8 illustrates the layout and the finished leg. This is a double spiral, and is the easiest type of spiral to cut. Lack of space prevents the taking up of single and other types of spirals.

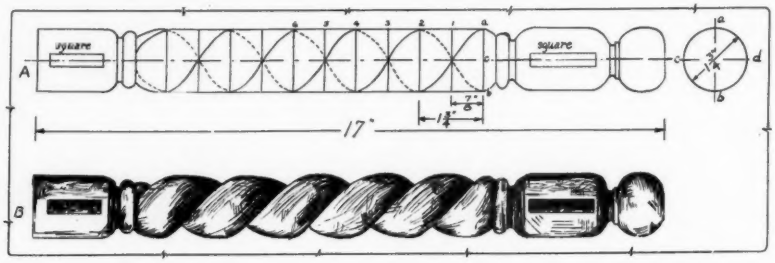


Fig. 8. Illustrating layout and finished spiral for Jacobean stool.

To make this spiral, the piece is first turned to outside dimensions. Keeping the piece in the lathe, lay off lines *a, b, c,* and *d,* on the cylinder, drawing the lines from end to end. Next, divide the cylinder by lines at 1, 2, 3, 4, etc., the spaces being equal in length to one half the diameter. Connect points *a, b, c, d,* etc. Keeping the work in the lathe, make a cut of the

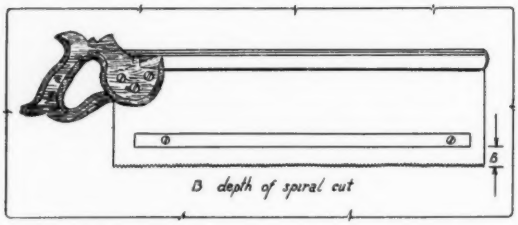


Fig. 9. Showing gauge as used in saw to determine depth of cut in spiral cutting.

required depth for the spiral with a backsaw on all spiral lines, revolving the piece as the sawing proceeds. The depth of a cut on a leg this size would be about ⅜ in. In order to be certain to saw to a uniform depth, it is well to gauge the depth of the spiral cut by securing a small strip of wood to the backsaw, as shown in Figure 9. After the sawing is complete, cut away the material with a chisel uniformly down to the cut from each side, and finish with wood rasp and sandpaper. The layout given in Figure 8 appears a bit confusing since both sides are shown; however, no difficulty will be experienced in actually laying out the work.

Right here may be a good time to say a word about tools. The beginner will do well to buy his tools a few at a time as he needs them. He should buy only good tools which are able to hold practically a razor edge in the hardest wood used by the carver. The expert wood carver uses many tools, but the amateur, or the student of industrial arts can get on fairly well, and do excellent work, with about a dozen well-selected tools. To some extent, of course, the drawings and designs must be adapted to the range of tools in the possession of the student.

As the subject of carving is studied, the student should look about and he will soon discover many fine examples of carving. This study will be very useful to him. True, some, or perhaps much, of this carving may be machine carving, but examination of it will be useful just the same. One of the amateur carvers in an evening class for adults did some of his "homework" by carving in ivory soap. It was possible with this medium to use regular carving tools, and the practice taught him to think and to work in three dimensions, without being bothered by the grain running in opposite directions in the wood. The wood-carver's trick of being able to cut with, against, or across the grain of the wood from one position is something that has to be learned. The soap medium overcame some of these difficulties for the beginner. The practice of working in soap is not to be recommended, as a rule, but this man seemed to gain confidence by this practice.

When the carver has finished his work for the day, he must carefully clean and oil the edges of his tools — *especially if he is working in soap.*

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TECHNICAL VOCABULARIES

John T. Shuman, Williamsport High School, Williamsport, Pennsylvania

This is the third vocabulary list and is confined to terms used in the electrical shop.

Terms Used in the Electrical Shop

accumulator
adjusting screw
admittance
aërial
alarm system
alignment
alloy
alternating
alternator
aluminum
ammeter
ammonium chloride
ampere
amplification
amplifier
amplitude
anion
annunciator
anode
antenna
arc
armature
armored cable
attachment plug
attraction
audio
automatic
auxiliary
back pitch
bar-wound
battery
A
B
C
charger
connections
Daniell
dry
Edison
gravity
Leclanche
storage
transformer
bell
binding post
blowtorch
bolometer
booster
bracket
branch splice
brass
broadcast
bronze
brush

burglar alarm
bus bars
buzzer
cable
calorimeter
candelabra
candle power
capacity
carbon filament
carbonizing
cartridge fuse
cathode
cell
charge
charger
chemical
chemical action
choke coil
chromic acid
circuit
cleats
code
coil leads
coil pitch
coils
coil winder
combination switch
commutator
compensator
compound wound
concentrated
condenser
conductivity
conductor
conduit
contact
contactors
controller
convenience outlet
converter
copper
core
coulomb
counter electro-motive force
couplers
cross-connected
crowfoot gravity cell
current
cut-out
cycle
dangerous
demagnetization
density
depolarize
detector
diagram
diaphragm
differential motor
direct
drum winding
dry cell
duplex
dynamo
dynamometer
economy coil
efficiency
electric
electrical
electrician
electricity
electrification
electrify
electrode
electrolysis
electrolyte
electromagnet
electromotive
electron
electroplating
electrostatics
element
enameled wire
energy
equalizer
equation
ether
exciter
extension
eyebolt
fading
fan
farad
Farady
field coil
field core
filament
filter
fixture
flasher
flexible
flowmeter
flux
formula
form-wound
fractional pitch
frequency
friction
frog-leg winding
full pitch
furring
fuse
  cartridge
  plug
fusible link
galvanometer
gap
gauge
generator
gravity-drop annunciator
grid
grounded
gutta-percha
hand-wound
heating unit
henries
heterodyne
hickey
high tension
horse power
hydroelectric
hydrogen
hydrometer
hysteresis
ignition
illumination
impedance
incandescent
inductance
induction
induction coil
inductor
inert
insert
install
installation
instrument
insulated
insulator
interchange
interrupter
joule
junction box
kilocycles
kilowatt
knob
laminated core
lamp bank
lap-wound
lead burning
lead peroxide
lead plate
lighting arrester
line drop
local action
lodestone
lug
luminous
magnet
  electro
  lifting
  natural
  permanent
magnetic
magnetism
magneto
make-and-break system
mandrel
manganese dioxide
mazda
megohm
metallic
meter
micrometer
microphone
mil
mil-foot
milliampere
modulation
mogul
molecule
motor
multiple
multiplex
negative
Nernst lamp
neutral
neutrodyne
nitrogen
nonconductor
nuclei
Oersted
ohm
Ohm's Law
open circuit
operating
oscillate
oscillation
outlet
overload
panel board
paraffin
parallel
peak load
permeability
phase
phenomena
phone
pigtail
platinum
pliers
plug
polarity
polarization
poles
polyphase
porcelain
positive
potential
potentiometer
power
primary
proton
push-button
quadruple
radio
radioactive
rat-tail splice
reactance
receiver
receptacle
rectifier
reëntrant
regenerative
relay
remote control
repulsion
residual
resistance
retrogressive lap winding
reversing
rheostat
ring winding
rotating field
rotation
rotor
sal ammoniac
saturation
sealing compound
secondary
segments
self-induction
semaphore
separators
series
shellac
shunt generator
Siemens' dynamo
silver
simplex
single phase
skinning
slot
socket
soldering
solenoid
spark
splice
starter
static
stator
storage battery
stranded wire
strap-winding
sulphuric acid
superheterodyne
support
switch
switchbox
symbols
synchronous
tape
tap splice
telegraph
telegraph sounder
telephone
terminal
test lamp
thermo-couple
timer
transformer
transmission
transmitter
trembler
triplex
tungsten
tuning
underwriter
unit
universal
vacuum
variable
vernier
vibration
vibrator
volt
Volta
voltage
voltmeter
watt
wattmeter
Watt's Law
wave winding
Western Union splice
winding
wire gauge
wiring
X-ray
Y-connection
zinc
zinc chloride

—◎—

A DAY IN THE SCHOOL SHOP

I. G. Terry, Senior High School, Marshalltown, Iowa

Do you know how to run a shop
So that it will not be a "flop"?

Just rise and say at break of day
That you are in the game to stay.
Shave, brush your teeth, and comb your hair;
Dress, take a walk in God's fresh air.
Ask aid Divine that you might be
Imbued with love and sympathy;
And all day long just keep in mind
That, come what may, you will be kind
To everyone you chance to meet
In classroom or upon the street.

From behind the scenes direct your play
In a meek, sincere, and modest way.
Be firm and honest, just and fair;
Be always on the job; be square.
And each day see that some new skill
Is conquered by a stubborn will,
And that some new ability
Is mastered in humility.
If this is done, your task will be
From envy, grief, and worry free.

But don't forget that each new day
May offer some peculiar way
Of solving problems, old and new;
So plan your work with that in view.
Remember, too, in the plans you make
That each boy's future is at stake;
That the central theme of all your plan
Is to make the boy a better man.

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

The End of the Year

From the dawn of history the last days of the waning year have suggested retrospection, appraising analysis, and courageous resolutions. And always New Year's resolutions have been the subject of innumerable witty remarks. The mere mention of them is likely to bring forth anything from a polite smile to a loud and gusty guffaw.

Despite the disrepute into which New Year's resolutions have fallen, the approaching end of the year is still an eminently suitable time for a backward look of appraisal, a summing up of the findings disclosed, and a purposeful planning for the future.

Just what has been accomplished in my shop during the past year? may well be the query which a shop teacher puts to himself. Have the results obtained with the students been really satisfactory? Has the work been carried on in a proper way? Can the arrangement of my equipment be improved? Is my method of keeping house above reproach? Have I made every effort to cut down waste? Is my shop functioning so that the administrative heads have little trouble in selling the idea of the school shop to the taxpayer? Have I kept abreast of the times in the matter of philosophy of education, objectives of my work, course outlines, illustrative material, objective testing? Have I read and contributed to the printed record of the work accomplished in my professional field? How can I improve my work in the coming year? How can I make the needed improvements? In what way can I make the work of the new year better than last year's?

The foregoing is a formidable array of questions, and yet the list is far from complete. What is more, this writer does not forget that he is proposing these questions to shop teachers who are working under reduced salaries, with increased teaching loads, and with severe cuts in the allowances for materials and equipment. The question may be asked whether it is not preposterous to ask shop instructors, laboring under such handicaps, to spend thought and energy on improving themselves and their work, when after all, the general public, and in many instances, their own immediate superiors in the school, appreciate so little what the shop contributes to our general scheme of education.

In spite of present conditions, however, the real teacher will try to improve his work. Surely, a poorer grade of work will not help the taxpayer see that industrial-arts and vocational education are necessary and integral parts of general education. Equally certain it is that the student of today needs this type of education more than did his brother of yesteryear. So long as the teacher stays on the job, so long he owes it to the student and to himself to do his very best to make his work function 100 per cent in the lives of all those who come in contact with it.

After all, while the salaries are needed to maintain a decent standard of life, nevertheless present conditions have drastically affected the lives of probably more than 80 per cent of our people. During all of this trying period most of the teachers have had at least the solace of work to keep their minds from falling into absolute despondency. This in itself is a blessing which only those who have not worked for several years can fully comprehend. Therefore it is proper that as 1933 draws to its close, thoughts of gratefulness for the blessing of possessing a job even if the duties have been increased and the salary decreased come to our minds. It is equally fitting and proper that we look at the work of the past year appraisingly and if there are opportunities for improvement, to do our best to take advantage of them.

Using Copyrighted Material

Again and again teachers fail to observe the copyright laws. The fact that these laws are stringent and possess teeth — even sharp teeth — is not the reason why this editorial is written. The teacher simply cannot permit himself to appear in the rôle of one who does things that may be labeled unethical or unprofessional. Yet when a teacher directly copies anything, be it illustrations or subject matter out of copyrighted books, and then disseminates it as his own, the author of the book or publication from which the material has been taken has the same right to legal redress as the one from whom anything else has been unlawfully taken.

The purpose of these remarks, then, is to inform those who wish to protect themselves against involuntarily offending against the copyrights of others. The copyright act of March 4, 1909, Section 320, Paragraph 3, protect the owner of the copyright as to every part of the book or magazine that is copyrighted, and any person, whether a teacher in school or otherwise, who copies a part of a copyrighted book or magazine, whether it be the reading matter or the illustrations, even though he uses it in mimeographed form and solely for the consumption of the students in his class, is infringing the copyright. This, then, at once shows that teachers may not make reproductions of parts of textbooks. Of course, they may absorb the ideas of an author in a copyrighted work and prepare their own statements covering the ideas or principles embodied in the work, but these statements must be original with the individual and not a direct copy of the author's words in the copyrighted work. The teacher may also make use of a reference book for instructional purposes just as though it were a textbook regularly assigned to his students, but he may not deliberately copy portions of the work and embody them in his own lessons.

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Be a Good Scout

The good turn each day in scout work is a fine effort to make the Boy Scout conscious of being helpful to others. The emphasis placed on the development of this important trait does much to make the boy develop into a coöperative, civic-minded youngster.

The shop teacher can well adopt this bit of teaching from the *Scout Manual*, and apply it in his own classes. As a matter of fact, he can well adopt it in his own life and make it a personal slogan to do a good turn (something extraordinarily good) to some boy each day of the school year. Under the present economic conditions, many students who come daily before the teacher need just a little extra consideration from someone to take the drabness out of a life made prematurely cheerless.

Need for Publicity

The past few years have conclusively demonstrated that there are very few people who really know why industrial-arts and vocational education should be taught in the school. Volumes have been written on the subject, speakers have propounded their thoughts on this theme the country over, and yet the general public seems to be shrouded in abysmal ignorance of the reasons for including this work in the school curriculums and of the results which are to be expected of the courses offered in the school shops.

In making these general statements, one must not forget that the charges made against the public may be made with equal truthfulness against many of the teachers of industrial-arts and vocational education themselves. Dr. Homer J. Smith, in his talk before the Wisconsin Industrial Arts Association, a report of which appears elsewhere in this issue, makes the statement that in his graduate classes he has frequently asked the teachers present to submit a written statement showing in what way the subject which they are teaching differs from the other subjects offered in the industrial-education department.

With few exceptions, the responses consisted of blank papers and blank stares. If this condition of affairs is true for the teachers of industrial-arts and vocational education, no one really has a right to blame the general public for not knowing why these subjects, but recently added to the curriculum, should not be looked upon as frills and fads which can be advantageously taken out of the curriculum at least until these trying times be over.

The blame for this general ignorance about the real objectives of our work is hard to place. As we have said, much has been written on the subject, but evidently this material has not reached the right people. It might be assumed that school directors and school superintendents are well versed in justifying the subjects which are taught in the schools under their immediate supervision. But this assumption is not substantiated by facts. It is not uncommon to hear school superintendents addressing shop teachers, make the statement: "The reason why shopwork is being sacrificed under present conditions is that you have not sold yourselves and your subject to the public."

This is rather a naïve statement, coming from the man whose duty it is to justify the entire curriculum that is being offered in his school system. No one has ever heard the statement that history, geography, language, or mathematics should be abolished because the teachers of these subjects have not sold themselves to the public. Goodness knows, there are many flaws to be picked with the methods used in teaching these subjects in some school systems. Evidently these superintendents do not see the incongruity of choosing one subject, that of industrial arts, and placing it on a list by itself. Superintendents of this kind merely acknowledge that they do not know why they made industrial-arts work part of their curriculum, and the right kind of publicity about the "why" and "wherefore" of this subject has not reached them so that they could form an opinion.

Who, then, is to assume responsibility for the production and dissemination of publicity that will insure a more widespread acceptance of the subjects of industrial-arts and vocational education as a part of the general education of our country?

Now that industrial-arts teachers, as well as the vocational teachers, look upon the American Vocational Association as their national organization, it might be very appropriate for the members of this body to establish a publicity committee whose duty it would be to work out a general scheme of publicity that could be followed locally, for the state, or for the nation, and that could be adapted to reach not only our law-making bodies in times when laws detrimental to our work are about to be enacted, but would also provide a continuous flood of information and enlightenment addressed to the school administrators, to the teachers of general subjects, to the general public, and above all to the shop teachers on the job, so that everyone would become fully cognizant of the fact that industrial-arts and vocational education are a substantial and integral part of general education.

Stereotyping and Wax Engraving

R. Randolph Karch

Arsenal Junior High School, Pittsburgh, Pennsylvania

A related-subjects lesson for the school printshop.

A stereotype is a duplicate printing plate cast from a matrix. The procedure is as follows:

1. The form or engraving is locked up in a chase and taken to a stereotyping press like that shown in Figure 1. There are two methods of preparing the matrix:

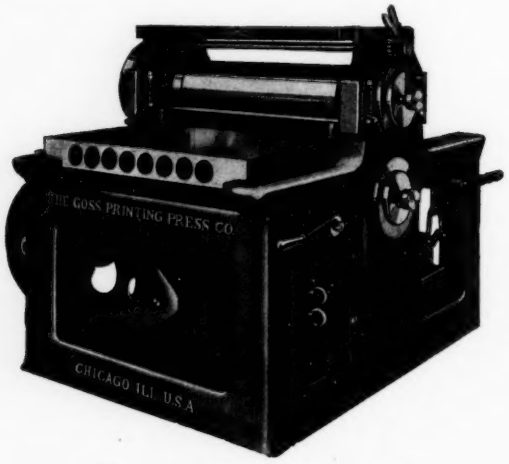


Fig. 1. A stereotype matrix press.

a) *The Dry Method.* A matrix, or "flong," which is made of a heavy, specially prepared paper, is placed over the form in the press (Fig. 1). The matrix, in turn, is covered with a molding blanket, and the form is then subjected to great pressure under the roller of the press. This action makes a clear, deep impression of the types on the matrix.

b) *The Wet Method.* The matrix is prepared in wet form. This wet matrix is laid over the form and either beaten with wire brushes or rolled in the matrix press like the dry matrix. The wet matrix is then dried with steam.

Fig. 3. Mounting plates for newspaper stereotyping. 1. Cast-iron base. 2. Interlay for different thicknesses. 3. Plate.

2. When the wet or the dry matrix is ready, it is trimmed and placed in the casting box shown in Figure 2. Stereotype metal, which is softer than type metal, is poured into the box, thus obtaining a duplicate form of the matrix.

3. When cooled, the matrix is stripped of the stereotype, and the latter then is planed type high, or, if cast in "shell" form, is mounted on wood or patent base, as shown in Figure 3.

Stereotypes are used chiefly by newspapers. Features, advertising illustrations, and news pictures usually are sent in matrix form to newspapers by syndicates.

Fig. 2. A stereotype casting box.

Curved stereotypes, in half-cylinder form, also are made to fit the cylinders in large rotary newspaper presses.

Durability of Plates. Stereotypes are coarse, and do not show the fine detail obtained with electrotypes, nor do they stand up under the number of impressions on the press like electrotypes. However, because of their cheapness, and because they can be quickly produced, stereotypes are well adapted to newspaper work.

An electrotype of a type form will show signs of wear after printing 40,000 impressions. A lead-mold electrotype will show signs of wear after printing over 300,000 impressions. A stereotype will show signs of wear after printing 25,000 impressions.

Wax Engraving. Wax engraving is a common method of making maps, rule forms, music, and the like. The copy is drawn or photographed directly upon a wax-covered metal plate. The work is engraved with sharp-pointed tools, much like cutting wood or linoleum blocks. Lines, both straight and curved, are cut by special ruling machines. The procedure for making the printed plate is the same as in making the electrotype.

Supplementary Reading for Electrotyping and Stereotyping

Hackleman, *Commercial Engraving and Printing*, pp. 342–368; 376–381; 384–398.
Henry, *Printing for School and Shop*, pp. 111, 107, 157, 245.
Partridge, *Electrotyping*.
Salade, *Handbook of Electrotyping and Stereotyping*.

Plates provided through the courtesy of The Indianapolis Engraving Company, The Challenge Machinery Company, and the Goss Printing Press Company.

Related-Information Scrapbooks

Max Chambers

Public Schools,
Federalsburg, Maryland

The value of the scrapbook in the school shop should not be overlooked. The making of such a book is a worth-while undertaking for the student.

UNTIL recently shopwork was considered by many an outlet for nervous energy and manual skill. All of the boys' time was consumed in the construction of the project with little or no thought given to the material or methods used. As a matter or fact, many boys in shops today cannot identify for the casual inquirer the wood or other material with which they are working. They should not only be able to identify the material but should know something about its source, cost, and methods of production, for what the boy makes is just a by-product of what he learns.

By coming in contact with various materials and methods, he should come to know their properties and benefits. For this reason related subject matter or associate learnings (as Kilpatrick would say) was instituted. The surface hardly seems scratched and the methods of presenting the matter vary as much as the projects offered.

One thing seems certain. No related subject matter can be taught without the *matter*. The matter cannot be used unless it is *organized*, and organization is helpless without proper presentation methods. Books are helpful, in this work, but much of the best information comes direct from the manufacturers in sheet, booklet, and pamphlet form, and from newspaper and magazine clippings and house organs. (See Homer J. Smith, *Teaching Aids*.) These papers are extremely difficult to preserve. Some, as a matter of fact, cannot be replaced, and many are almost impossible to find when needed. So why not permanently fasten all of the material on a given subject in a scrapbook? You will find scrapbooks mighty handy to have around even though daily reports are not the rule in your shop.

Books for the purpose are comparatively easy to get as a part of your salvaged-material program. Old bound (stiff back) catalogs can be had for the asking at stores, factories, and printshops. Old books can be used. The large sizes are better as they more nearly fit the material. The book will not appear to be "overstuffed" if one page is left in and two cut out. Hold a backsaw on the leaves near the center of the book and tear out. A touch of any adhesive will hold the matter in place. Heavy booklets can be tied in. An old inner-tube band can be snapped around the book to keep it closed.

To get the scrapbooks organized, a two-month contest offering two or three prizes should be opened. Each class member should be required to choose a subject with the understanding that his mark for the second month will be based on his scrapbook as a contribution to the shop library. The books should have the author's name and title painted on the front and be placed in an accessible and protected place for use as the occasion arises.

Scrapbook Organization

A special effort should be made to organize related subject matter so that any particular bit of information can be located in a short time. It may be organized on the same plan used in presenting it to the class by the student reporter. Here is a period plan. (Hectograph copy with spaces for writing.)

FEDERALSBURG HIGH SCHOOL
Industrial Education Department
Related Materials Daily Report Sheet

Name..... Date.....
(Title of Report)

1. Definition
2. Origin
3. Improvement
4. Parts or kinds
5. Comparison
6. Our application
7. Cost
8. Demonstration
9. Location of raw material
10. Future Prospects
11. Results or Benefits
12. References

When the report is completed the reporter asks his classmates the following questions:

1. Did you like my report? Why?
2. What was the outstanding point?
3. How could I improve it?
4. Any questions?

..... will report tomorrow on .....
This concludes my report.

To give the student time to gather information, the subjects for reports should be posted at least thirty days in advance and should follow the shop project work for each class as closely as possible. The reports are general and supplementary to individual instruction and group demonstrations for manipulative processes. Ten minutes should be allowed out of each period and only one subject taken daily by each class. The reporter is allowed the full period to prepare his report and to gather demonstration material. The names are listed alphabetically.

Paint a spot on the floor for the reporter to stand on. He should stand straight and be as presentable as possible. This procedure will make him more careful

about his everyday personal appearance. His classmates will criticize constructively when he asks "How can I improve my report?"

While a special room is helpful, it is in no wise essential, for the regular shop benches can be used as seats and the reporter can stand "on the spot" at one end facing the group. The shop manager stands on his right and the instructor on his left. When all is quiet the manager announces the reporter and the report. No report is complete without some illustration or a demonstration. The instructor adds what he can in a few words.

As soon as the boys see the value of being able to speak before the group and the unusual and helpful information given, they will become advocates of the cause and reciprocate by bringing in new clippings and booklets. The scrapbooks are never complete, but the boys will grow more than the books.

Casting in the School Shop—I

N. A. McMillan

Mount Vernon, New York

The first of a series of lessons on molding. The lessons are built up around projects, and each step is thoroughly explained and illustrated.

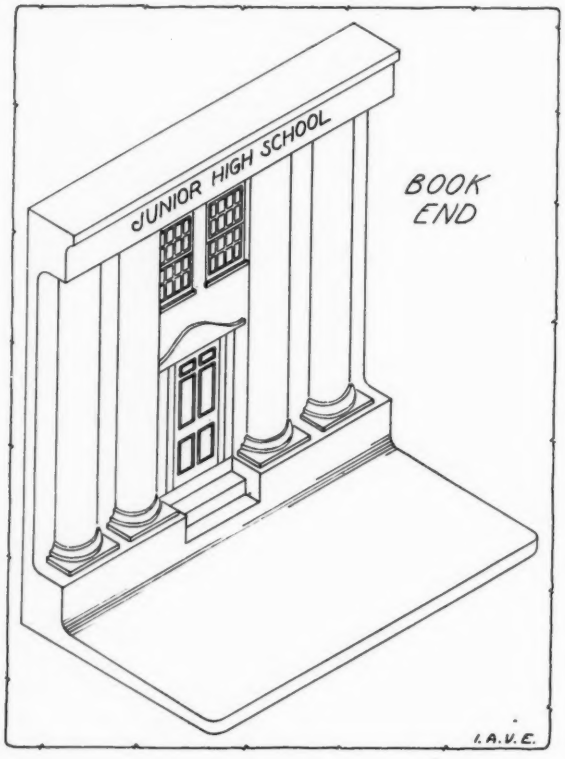
Molding

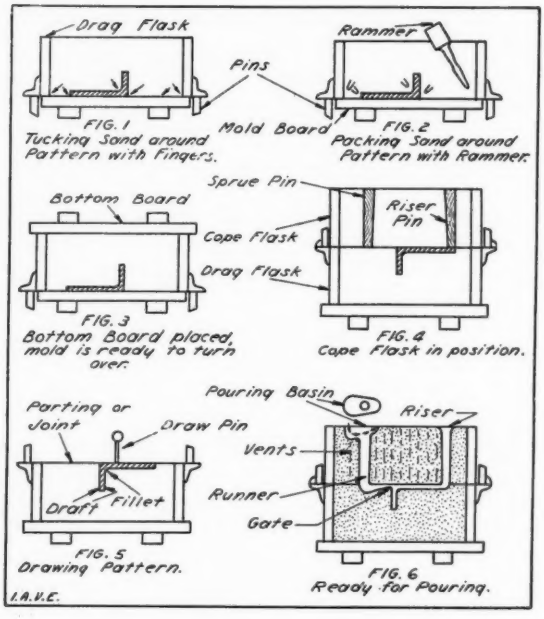
A. *Patternmaking related to molding*

Patternmaking is one of the most highly skilled trades, and it covers various types of work; namely, a knowledge of reading blue prints, making full-sized layouts with a shrink rule, wood construction, foundry fundamentals, and some knowledge of metals. It is not our purpose to go very deeply into patternmaking, but merely to cover the terms and techniques that affect the molding done in the school shop.

Types

We are concerned with four types of common patterns; namely, solid, split, irregular, and cored patterns. All of these types will be molded and cast in this course of study. For each type a definite project has been selected that can be later finished in a shop with very little equipment.





The first problem that confronts the patternmaker is, how to make a given pattern so that the molder can take it out of the sand without breaking the mold. In most of the common work, the patterns that are made fall into one of the four above-mentioned classes.

The Solid Pattern

In examining a pattern of this type, we have *draft* which helps to prevent the sand from breaking when the pattern is withdrawn. On all vertical surfaces draft is allowed depending on the depth or draw on the mold.

Wherever possible, all corners on the pattern are rounded over, and fillets are used in the internal corners. Fillets add to the strength of the casting. If the sharp corners were not broken, the metal rushing past them in the mold would break down the sand and produce a rough casting.

There are two very important terms used in molding that should be clear in the student's mind before starting to ram a mold. There are two sides to a pattern, *drag* and *cope*. The drag side faces down in a mold and is selected as being the best side of the casting, as the shape holds and the best metal forms at the bottom. Whenever possible, the largest portion of the pattern is put in the drag, because the cope sand hangs in space and is difficult to hold in place. The metal in the cope does not hold its shape, it is not clear, and gas holes are more likely to develop in it.

All patterns are made with a shrink rule because each metal shrinks a certain amount in the cooling process. Brass, aluminum, and bronze shrink 3/16 in. to the foot, as they cool off after being poured.

Before starting to mold a pattern, see that all surfaces are clean and smooth, otherwise the sand will stick.

With this preliminary knowledge we are ready to start working each step out on the first problem, using a book end or any solid pattern with a simple design and a flat back.

Project No. 1

Project: Molding a solid pattern, book end.

Suggestive projects: lamp and candlestick bases, paper weight, or any project that is a solid pattern with a *flat back*.

Tools and Materials: Bottom and mold board, cope and drag flask, pair of rammers, No. 4 and No. 12 riddles, shovel, trowel, slick, oval spoon and slick, bellows, sprue and riser pin, gate cutter, draw pin, vent wire, No. 1 Albany sand, graphite, and parting.

Procedure

1. See that the pattern is clean, surfaces smooth and dry.

2. Place the flat side of the pattern on the mold board off center to allow for sprue pin. This establishes a parting line.

3. Lay the *drag side* of the flask on the mold board, with the locating pins facing down.

4. Shake *parting* over the pattern. The parting prevents the sand from sticking to the pattern.

5. Shift new green sand over the pattern with a No. 12 mesh riddle. Use enough sand to cover surface of the pattern to a depth of about 1½ in. This makes a fine surface on the mold. Sometimes a seacoal or graphite is mixed with the sand, to make the sand less likely to burn or stick to the casting. Tuck the sand in around the pattern with the fingers, as shown by the arrows in Figure 1.

6. Fill the rest of the flask with a mixture of new and *used* sand (sand that has been used previously in molds and which has been in contact with hot metal). With the peen end of the bench rammer slanted in the direction of the blows, ram first around the sides of the flask, to insure the sand hanging in well, as shown in Figure 2. Next, direct rammer around the pattern, being careful not to strike closer than 1 in. from the pattern. Care should be taken not to ram unevenly, as the hard and soft spots thus made affect the hot metal. Finish by using the butt end of the rammer. Strike off loose sand with a straightedge. Lay on about ¼ in. of loose sand evenly; this will take care of any unevenness of the bottom board.

7. Lay the bottom board on top of the flask and press down the board, rubbing it slightly back and forth to make it set well (see Fig. 3), and to hold the sand in place. Turn the whole unit (that is, the mold board, drag flask, and bottom board) over.

8. Remove the mold board.

9. Shake parting over this surface.

10. Place on the cope flask.

11. Place the sprue pin and the riser pin in the sand as in Figure 4.

12. Shake new green sand over this surface with a No. 12 mesh riddle.

13. Fill up the flask as you did in the drag. Be careful not to ram the cope too tightly, because the gases will not be able to escape if it is rammed too tight. Aim to ram just enough to make a proper *bond*.

14. Lift out the sprue and riser pin.

15. Lift off the cope flask and place down on its sides. Dampen the edge of the mold with a sponge.

16. Fasten a draw pin at the approximate center of gravity of the pattern, as shown in Figure 5. If you do not want to damage the pattern, a small rubber vacuum cup will hold light metal patterns.

17. Tap each side of the flask lightly and draw the pattern out, being careful to lift straight so the sand will not be broken.

18. Slick up the mold wherever necessary, using either a straight or a spoon slick, whichever seems best suited to the surface.

19. Lift out any loose sand with the lift slicker.

20. Blow off the remainder of the loose sand with the bellows.

21. Brush the surface of the cope and drag with graphite and water, using a fine camel's-hair brush. This makes the surface of the mold more solid and fine. Care should be taken not to place too much water on the surface, as the hot metal may explode if the mold is too moist.

22. Cut away the sand with the gate cutter made from a piece of sheet brass bent in a U shape. Be careful to make the casting thin at the point where the gate touches it.

23. Place the cope flask over the drag flask (see Fig. 6).

24. Pierce holes in the cope flask with a wire; this helps the gases to escape.

25. Hold down the sand between the sprue and vent with a board attached to a handle.

26. Pore the metal in the sprue. It is better for two persons to perform this operation. One should hold down the sand, while the other person pores.

27. When the metal cools off, lift off the flask and break the sand.

28. The gate will break off at the thin portion where it joins the casting. The sprue and vent metal can be remelted and used again.

Question Sheet

Molding a solid pattern with a flat back

Directions: This is a multiple-choice test. Underline the correct response (or responses), to each statement.

1. Four common types of patterns that will be molded in this course are: (1) master, (2) split, (3) irregular, (4) metal, (5) solid, (6) cored patterns.

2. Two reasons for putting fillets on a casting are: (1) added strength, (2) appearances, (3) cleaner casting, (4) lighter casting.

3. Patterns are made with a shrink rule to (1) prevent warping, (2) take care of the loss in size, (3) keep its shape.

4. Metal shrinks (1) in its liquid state, (2) at the time of cooling in a solid state, (3) after being taken from the sand.

5. The top of the mold is the (1) cope, (2) drag, (3) cheek.

6. The mold board should be straight to (1) make a straight parting, (2) make a straight line on the casting, (3) prevent the sand from breaking.

7. It is necessary to leave draft on all vertical surfaces of a pattern because it (1) improves appearances, (2) increases strength, (3) permits drawing of pattern.

8. If the locating pin on the drag flask faced upward when ramming (1) the mold would be out of line, (2) the sand would break, (3) the cope flask would not have a locating position.

9. If a pattern is not accurately molded at the parting line, the casting will be (1) larger, (2) inaccurate, (3) porous.

10. The purpose of using parting material is to (1) fill the sand pores, (2) keep the joint and pattern from sticking, (3) protect the pattern.

11. A fine mesh riddle is used to sieve sand on a pattern to (1) preserve the pattern, (2) keep the pattern from sticking, (3) make a fine mold surface.

12. When the sand is rammed just as hard over the pattern as on the sides of the flask, (1) uneven sand pores develop, exploding the hot metal, (2) the sand cracks, (3) danger of breaking the pattern.

Directions: This is a true-false test. Make a circle around the capital T if you think the statement is true, or make a circle around the capital F if you think the statement is false.

T (F) 13. It is necessary to place sand over the cope before rolling the mold over.

T F 14. A riser is used on this job to supply metal to points needing it when the liquid shrinkage occurs.

T F 15. The riser helps to hold the gases in the metal.

T F 16. When the cope is rammed too hard, the gases pass too easily.

T F 17. The cope flask should rest on its side while away from the drag.

T F 18. The draw pin should be fastened to the pattern just to the right of center of gravity.

T F 19. Graphite is used on the face of the mold to prevent the metal from burning into sand.

T F 20. Graphite helps to make a smooth surface on the mold.

T F 21. The gate is made thinner at the point of touching the casting to cool off metal more quickly.

T F 22. If the mold is not weighted down, the casting may expand when pouring and break the cope sand.

T F 23. When we speak of sand having the proper "bond," we mean that the sand will crumble more easily.

T F 24. The advantage of dampening the edges of a mold before drawing a pattern is to prevent the edges from breaking.

T F 25. It is necessary to loosen a pattern before drawing it from the mold because it will draw more easily.

T F 26. If the mold is too damp, the hot metal will stick to the sand.

Instructor's Remarks:

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Problems and Projects

SMOKING STAND

William A. De Vette, Erie, Pennsylvania

(See Supplement No. 281)

The smoking stand detailed in the accompanying supplement is one which is very pleasing to the eye when completed, especially when finished with the spray gun in two colors, such as green and aluminum or french gray and gold.

The entire stand may be made of poplar. It requires the following material:

Bill of Material

Part No.	*No. required*	*Name*	*Material*	*Size*
1	3	Legs	Poplar	¾ x 2⅛ x 24¾
2	1	Spacer	Poplar	¾ x 6¼ x 9½
3	1	Base	Poplar	⅜ x 7 x 11
4	1	Body	Poplar	Built up (4 pieces ¾ x 6½ x 10½)
5	1	Top	Poplar	¾ x 7¾ x 11¾
6	1	Drawer Slide	Poplar	⅜ x 3½ x 5
7	1	Handle	Poplar	¾ x 5½ x 10
8	2	Drawer Sides	Poplar	5/16 x 3½ x 3⅝
9	1	Drawer End	Poplar	5/16 x 3½ x 4 15/16
10	1	Drawer Bottom	Poplar	5/16 x 2 15/16 x 4 5/16
11	1	Drawer Front	Poplar	Cut from body
12	1	Drawer Pull		(Purchase)
	1	Ash Tray	Metal	(Purchase)
	9	Screws		1½" — No. 10 f.h.b.
	9	Screws		1" — No. 8 f.h.b.
	3	Screws		1¼" — No. 10 f.h.b.

The first step in building this smoking stand is to secure a suitable metal ash tray.

Cut the four pieces for the body to width and length, plane them smooth, and glue them together.

On a sheet of paper lay out the patterns for the legs, handle, spaces, and the three sizes of ellipses. All but the leg may be made as half patterns and folded before cutting out to obtain perfect symmetry. Ellipses should be laid out by a geometric method as the approximate (circular arc) method will not be found very satisfactory.

The patterns are next traced on the wood which is then cut out on the band saw, the legs being nailed or clamped together for this purpose to get them alike.

All parts must now be smoothed with file and sandpaper.

The holes for fastening the top to the body and the clearance holes for the screw driver are bored in the body as are the holes for the saw clearance.

The base is next fastened to the body as indicated in the details, the screws being placed carefully to miss the lines for the band saw.

The body may now be sawed out for the drawer, the front being saved for the drawer itself.

The drawer slide is next fitted in and toenailed in place.

The drawer is then built as shown and assembled on the drawing.

In assembling, screw the handle and the top together first. Remove the screws from the body and base, screw the top to the body, and then replace the base.

Assemble the legs and spacer and then screw the upper ends of the legs to the body, being careful to get the legs perpendicular.

Shellac interior of body and both inside and outside of drawer. Insert drawer and apply finish with a spray gun or as desired.

A QUEEN-ANNE COMMODE

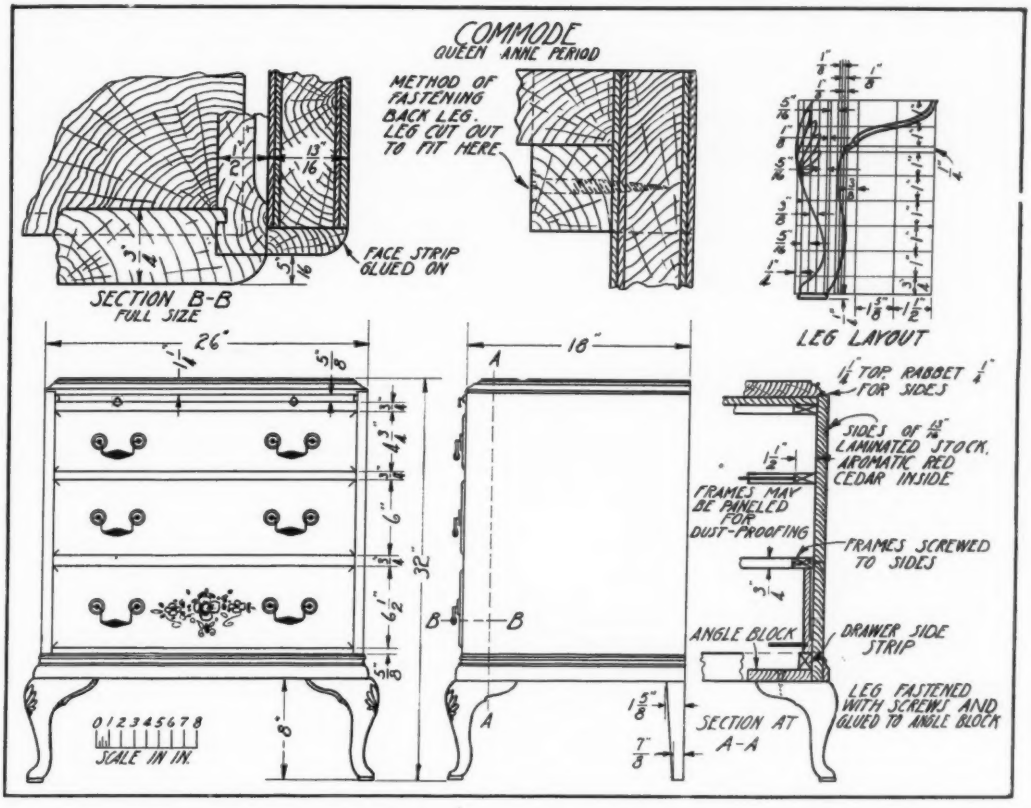
R. M. Hammes, Abraham Lincoln High School, Council Bluffs, Iowa

Here is a problem that will interest a number of students because of its adaptability and serviceable qualities. Made to the sizes shown, the commode fits equally well in the living room, reception or stair hall, sleeping chamber, or to fill in that barren spot which occurs in many rooms. Not only is it a decorative piece, but one of utility as well.

Turned legs may be used if desired. The decoration or finish of the piece may be varied to suit any mode. The cabinet made in walnut, finely finished, with its simple lines, is hard to excel in beauty; but if desired, colored lacquers or paints may be used, or a black background with Chinese decoration will furnish the desired pleasing note in some rooms. The decorative scheme must, of necessity, be left chiefly to the individual. The hardware chosen must harmonize with the decorative scheme. Even the placing of the hardware will have a direct effect upon the whole. If a taller effect of the cabinet is desired, place the pulls a little closer together, if a squatty appearance is wanted place them farther apart. A larger chest of drawers can be made from the design by increasing the proportions the desired amount.

The sides of the commode are of 13/16-in. five-ply stock; one side of the desired exterior veneer, the inside of aromatic red cedar. Sides and backs of drawers, and the bottoms may be of red cedar, but this material is not well adapted to use as

drawer sides. A face strip of about ¼-in. thickness is glued to the front edges of the sides to cover laminations and afford surface for rounding as shown in the detail. The drawer fronts are rounded off at the edges and the fronts project from the face of the cabinet. They do not cover the drawer openings,

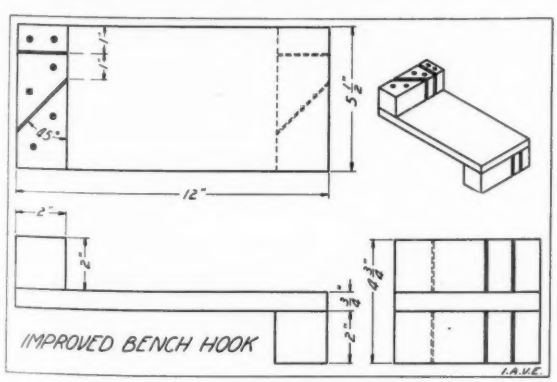


however, so fitting must be carefully done. The back of the piece is a framed panel set between the sides and glued. The drawer slide frames are screwed to the sides of the cabinet. The top is glued in place only after all other assembling has been done. Finishing nails may be used in securing top and, after setting, the holes must be carefully filled, if a good job of finishing is to be done. Molding on the base may be cut on the 2-in. base strip, or a separate piece of molding may be set in.

AN IMPROVED BENCH HOOK

A. D. Fields, Hamilton Township High School, Lockbourne, Ohio

This bench hook is very satisfactory as a beginning project for first-year students in woodwork. It is more difficult to construct than the old-type bench hook. The saw-guide block consists of three pieces instead of one, and four accurate saw cuts, one miter, and one straight saw cut on each block are required. This project affords the following experiences: measuring for length, measuring for width, end sawing, angle sawing, setting screws, boring, gauging, surface planing, edge planing, and end planing.



If the saw cuts in the blocks are accurately made, they will enable the amateur to make a miter cut on a small piece, such as a picture molding, as accurately as he could in a regular miter box.

After the blocks are squared and surfaced, the saw cuts should be made only 1¾ in. deep. The block can then be handled as a whole. After it has been properly fastened to the board, and the screws firmly set, the saw cuts should be completed.

THREE METHODS FOR MAKING BENCH DOGS

G. H. Snaddon, Central High School, Detroit, Michigan

Problem: To make steel bench dogs for wood benches.

Processes Involved: Laying out, drilling, countersinking, centering, turning between centers, shouldering, chuck work, riveting, milling.

Specifications: Use C.R. steel or M.S.

Procedure (Method 1, Design A):

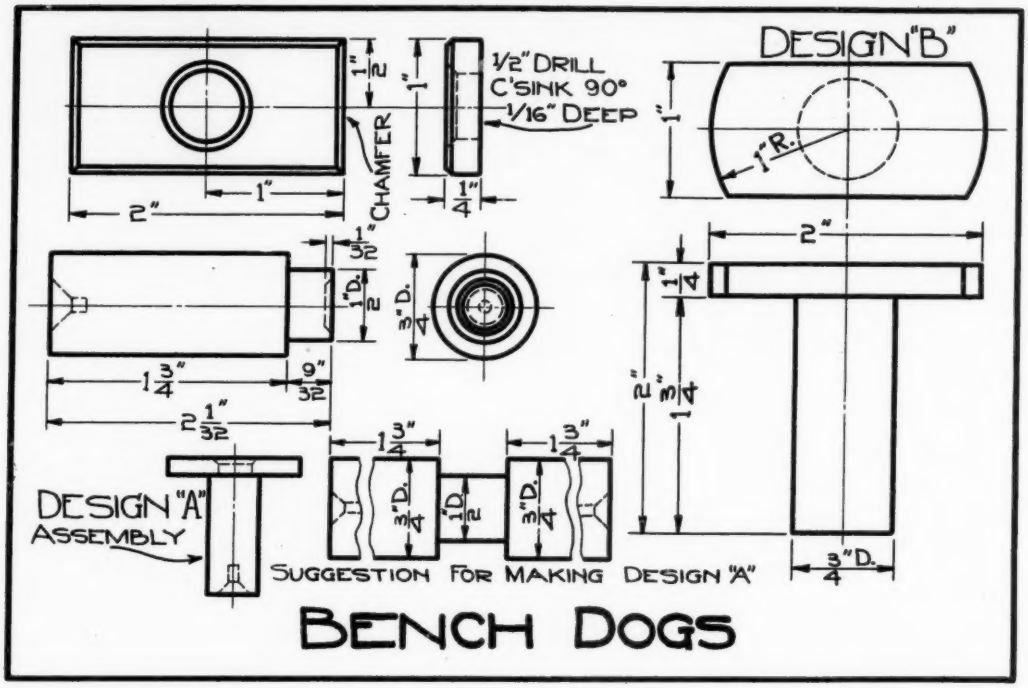
1. Select and mark a piece of flat stock 2 in. long. Place flat side down in the power hack saw, then saw to the line.
2. Square sides and ends.
3. Draw diagonals to locate the center.
4. Lay out hole as shown for design A in the illustration. NOTE: Before drilling, make the center-punch mark in the middle heavier so that the drill will locate itself easily.
5. Drill the ½-in. hole.

a) Place the stock in the drill-press vise with a block of wood under it.

b) Secure the following tools: ½-in. twist drill, No. 1 taper sleeve, No. 2 taper sleeve, drill drift, and ball-peen hammer.

c) Fit the sleeves to the drill, then fit same into the drill-press spindle.

NOTE: Use a block of wood to tap the sleeve or chuck lightly into the drill-press spindle.



d) Adjust the table for height, and move it so that the center of the hole is in line with the point of the drill.

e) Set the machine for medium speed and feed.

6. Countersink the hole to the correct depth. (It may be necessary to use a larger drill for this purpose.)
7. Chamfer ends and edges slightly in the vise, and remove burr left by the drill on the underside of the work.
8. Select a piece of round stock approximately ¼ in. oversize in diameter.
   Suggestion: Two pieces can be made from one piece of stock as shown at A in the illustration.
9. Mark ⅜ in. longer than the finished length.
   Explanation: The additional length is to allow for removing the center hole on one end.
10. Saw to the mark in the power saw.
11. Remove the faceplate and mount a three-jaw universal chuck on the lathe spindle.
    Safety Precaution: (*a*) Always place a board across the carriage or V ways to rest the chuck on when mounting or removing it; (*b*) Start the chuck square on the spindle threads; (*c*) Hold the chuck firmly when removing it so that it will not drop on your fingers.
12. Chuck stock. Face one end. Center.
13. Remove stock from chuck. Mark to length. Face to the mark. Center.
14. Remove chuck. Insert live center and true it up. Set dead center in alignment.
15. Clean the threads on the lathe spindle and those in the faceplate carefully, then screw the faceplate on the lathe spindle.
16. Set up the lathe.
    a) Sharpen your tool bit to the correct clearance and rake angles.
    b) Set the tool post to the left of the compound.
    c) Take a short hold of the tool bit and the tool holder.
    d) Set the tool bit on the center line of the lathe. Test for height by placing against the headstock center.
    e) Have the compound back even with the base for rigidity.
    f) Oil the dead center.
    g) Place a lathe dog on the stock and mount same between centers. Allow no end play. The stock should revolve freely.
    h) Adjust the stock between centers frequently and keep the dead center well lubricated with oil and white lead.
17. Rough-turn diameter to within about ¼ in. from the dog. Use medium speed and medium feed.
18. Finish turn to size. Use outside calipers or micrometers to test diameter.
19. Reverse work. Rough- and finish-turn to size.
20. Turn to ½-in. diameter, 21/32 in. from the end. Fit to the ½-in. hole in the flat piece.
21. Remove faceplate. Mount a three-jaw universal chuck on the lathe.
22. Chuck stock, then face out center hole. Next, recess as shown in the illustration.
23. Remove from chuck, assemble, then rivet the two pieces together in the vise.

Procedure (Method 2, Design A):

NOTE: For flat piece follow the same directions as for Method 1 above (directions 1 to 7).

1. Saw a piece of ¾-in. round stock ⅛ in. longer than the finished length shown on the blue print.
2. Mount a three-jaw chuck on the lathe spindle.

3. Face one end smooth.
4. Remove from the chuck. Mark to length. Rechuck. Face to the mark.
5. Turn to ½-in. diameter, 9/32 in. from the end. Fit to hole in flat piece.
6. Recess end 1/32 in. deep, as shown in illustration.
7. Remove from chuck, then rivet together in the vise.

Procedure (For Design B):

NOTE: The following directions are for making two bench dogs from one piece of stock.

1. Select stock approximately 2⅜ in. in diameter.
2. Mark stock 4¼ in. long and saw to length in power saw. Explanation: The additional length is to allow for sawing and facing.
3. Mount three-jaw universal chuck on the lathe.
4. Chuck stock. Face one end.
5. Remove stock. Mark to length. Rechuck. Face to mark.
6. Turn to ¾-in. diameter 1¾ in. from end.
7. File-finish with smooth file, then file end round.
8. Reverse in the chuck and turn opposite end to the same diameter for the same length.
9. Turn the center part to the required diameter.
10. Remove from chuck.
11. Lay out center part to width shown. Use a surface gauge and a V block on a surface plate.
12. Place in milling machine vise and mill to the line on both sides.
13. Saw the two dogs apart in the power saw.
14. Chuck in the lathe and face each one separately to the correct thickness.
15. Remove burrs by filing in the vise.

Appraisal: The finished bench dog should fit the holes in a wood bench and should also be a finished piece of work in appearance.

Tools Used: Combination square, scratch awl, bastard file, center punch, dividers, drill-press vise, twist drill, sleeves or sockets, drill drift, ball-peen hammer, center drill, lathe dog, surface gauge, V block, surface plate, rule, milling-machine vise, plain milling cutter.

References: Burghardt's *Machine Tool Operation,* Part I — Chapters 1 to 8 inclusive, also Chapters 12, 13, and 14; Part II — Chapters 1 and 2; Smith's *Advanced Machine Work,* Sections 1 to 6 inclusive; *How to Run a Lathe,* by South Bend Lathe Works; Leonard's *Machine Shop Tools and Methods,* Chapters 11 to 15 inclusive.

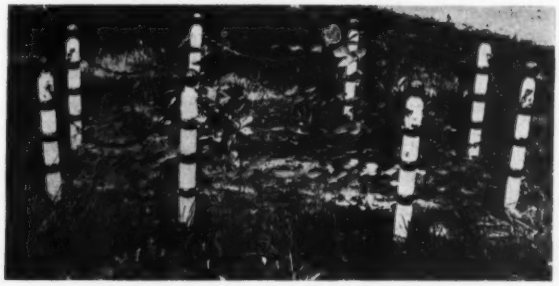
Questions: Write the answers to the following questions and hand them in to your instructor when completed:

1. Show clearly by a sketch how a piece of stock should look when correctly centered for turning in a lathe.
2. Describe how to set up a lathe for straight or cylindrical turning between centers.
3. For what are the following tools used?
   (*a*) combination square, (*b*) scratch awl, (*c*) dividers, (*d*) sleeve or socket, (*e*) surface gauge, (*f*) V block, (*g*) surface plate.
4. What do you understand by the following terms:
   (*a*) laying out, (*b*) countersinking, (*c*) recessing, (*d*) end play, (*e*) rough-turn, (*f*) finish-turn, (*g*) rechuck, (*h*) chamfering.
5. Explain why it is necessary to clean the lathe-spindle threads and the faceplate threads before mounting the faceplate.
6. Why is a block of wood used under the work when drilling?

SIMPLE WOOD-TURNING PROJECT

Frank Bentley, Missouri Valley, Iowa

Much of the benefit which a student derives from working on a project arises through the enthusiasm and sustained interest which he puts into it. If the finished product has a practical use, it will usually maintain the student's interest.

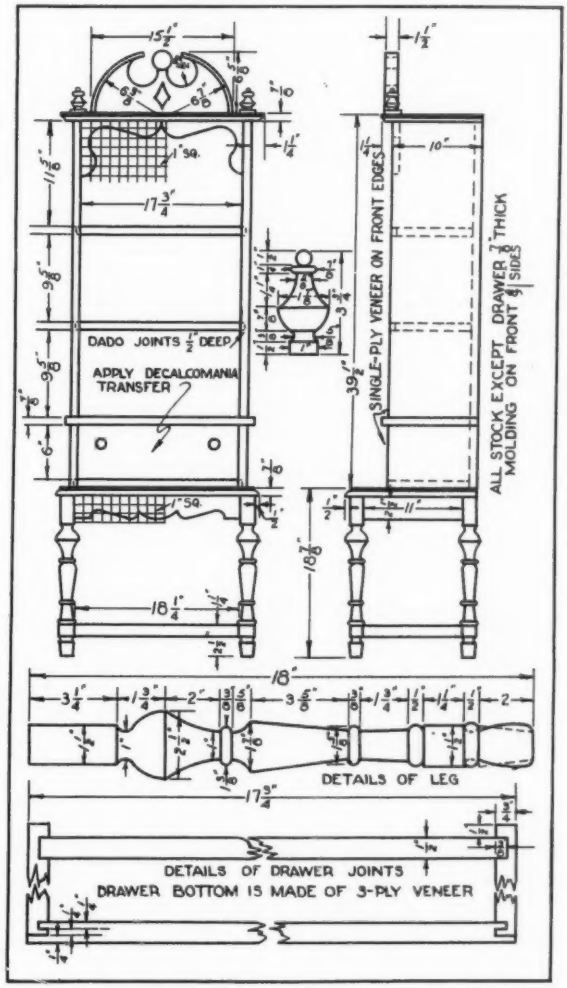


There are few practical things that can be made by the student who is engaged in elementary wood turning. The illustration shows a practical project that answers very well as a beginning project on the wood-turning lathe, and yet has a practical value.

PIER CABINET

Carl v. Lindeman, Western State Teachers College, Paw Paw, Michigan

A piece of furniture that always finds a place in the average home is a pier cabinet. The design here shown is very simple in construction and may be varied to suit the student. The cabinet consists of two parts, the upper part and an independent base. This may be used as a bench when detached from the top. White pine was used in the construction and the complete


DADO JOINTS ½" DEEP
APPLY DECALCOMANIA TRANSFER
SINGLE-PLY VENEER ON FRONT EDGES
ALL STOCK EXCEPT DRAWER ¼" THICK MOLDING ON FRONT ½ SIDES
DETAILS OF LEG
DETAILS OF DRAWER JOINTS
DRAWER BOTTOM IS MADE OF 3-PLY VENEER

project was finished in jade-green lacquer. Decalcomania transfers may be applied on the drawer front if desired.

A NONSKID OILSTONE

C. V. Darby, Cedar Rapids, Iowa

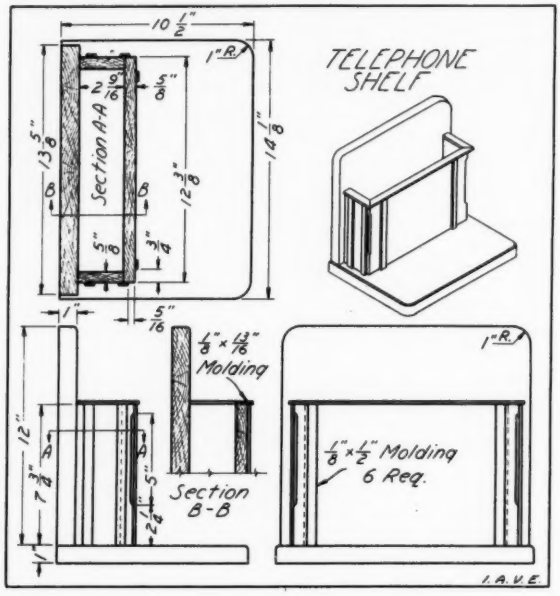
Nearly every woodworker has experienced the annoyance of having the oilstone creep all over the bench when using both hands in sharpening a chisel or plane iron.

To obviate this, glue a piece of medium-coarse sandpaper (or better yet, garnet paper) to the bottom of the box in which the oilstone is mounted. The sandpaper will bite into the bench just enough to keep the stone from moving around, but not enough to mar the bench top.

TELEPHONE SHELF

Walter H. Deichert, Hillside, New Jersey

The project described herewith is one that has been found useful, both in the school shop and in the home. The dimensions shown may be varied to accommodate the local telephone book. This project may be made either of soft wood or of



hard wood. It should be finished to match the furniture or the trim of the room in which it is to be used.

When completed, the shelf is attached to the wall at a convenient height.

PRESSROOM EFFICIENCY

Charles Cryderman, The Stout Institute, Menomonie, Wisconsin

The efficiency of production in the school pressroom depends upon the layout of the shop, the equipment in the shop, the organization of the workers, and hygienic conditions.

The natural routing order of a job through the shop is: composing room, stone department, and press department. The stock comes from the storeroom, through the cutting department, to the press department, and then to the bindery or directly to the shipping department. The layout of these departments in the school shop should be such that there will be as little interference with the smooth progress of the work as possible.

The machinery and equipment should be in such a condition that it permits of rapid and accurate work. The pressroom should be well lighted because of the exacting requirements of the work done there. It should be heated to a uniform temperature of 70 degrees in the cold weather, in order to avoid static, offset, picking, and slip sheeting as much as possible. Certain paper should be seasoned, especially in cold weather.

Individual motor drives should be used as much as possible. Numerous accessories can now be obtained for the press department. Gas burners which save the cost of slip sheeting, type-high planers, roller racks, delivery racks, mechanical overlays, trucks, make-ready tables, patent bases, etc., all help to increase the efficiency of the pressroom, and the student should become acquainted with them.

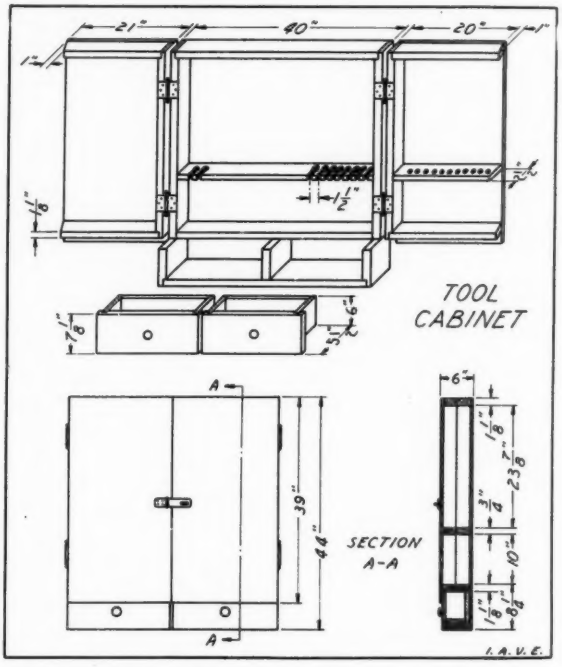
As far as the organization of workers is concerned, the pressroom in the school printshop is, of necessity, forced to arrange its schedule so that every student will get some experience in the supervisory work. For this reason, the foreman in charge may not always be the best man for the position. It is well, however, to call the student's attention to the fact that the successful foreman must know the work from every angle by personal experience.

With present-day increase in class sizes, the printing teacher should be on the lookout to so organize his students that they will assist him in as much of the actual conduct of the classroom as possible, thus securing valuable experience in directing and coöperating with others.

A HANDY HOME-SHOP TOOL CABINET

G. A. Schmidt, Colorado Agricultural College, Fort Collins, Colorado

The illustration shown herewith pictures a very handy cabinet for the storing of a complete set of tools. The directions beneath the cut give suggestions for the storing of tools in the cabinet. The scheme of placing and hanging the tools, as given, may be varied depending upon the tools to be stored.



Left Door — 2 saws and 1 level. Right Door — *Above shelf:* 1 drawknife, 1 hack saw, 1 bit brace. *On shelf:* twist and auger bits. *Below shelves:* 2 oilstones. Main Part of Cabinet — *Above the shelf:* 1 steel square, 1 pair of tin snips, 1 bevel square, 2 saw sets, 1 spokeshave, 1 hammer, 1 hand ax, 1 mallet, 1 putty knife. *On shelf:* 2 screw drivers, 1 pair of pliers, 3 files, 3 nail sets, 1 Yankee drill, 3 or more chisels. *Below shelf:* 1 wrecking bar, 1 block plane, 1 smoothing plane, 1 jack plane.

The suggestions for storing the tools were derived from a similar cabinet that has been in use for many years.

Painting an outline of the tool directly behind each tool, is a very great help and convenience. It not only saves time in replacing tools in the cabinet, but also aids materially in the

prevention of the loss of tools. One can at a glance see what is missing if any tools are not replaced.

This tool cabinet is particularly well adapted to the needs of the home mechanic or of the farmer. It is much more practical than a tool chest and its construction presents less difficulty.

The cabinet is small enough so that it can be placed directly over a workbench. This makes it very convenient for the workman when he reaches for or replaces a tool.

CEDAR-LINED WALNUT CHEST

S. A. Maples, Central High School, Nashville, Tennessee

This cedar-lined walnut chest is an excellent project for a student in advanced woodworking classes. It is simple in construction, yet difficult enough to challenge the best ability of any boy in senior high school. Its construction calls into use almost all the bench tools, as well as the most common machines found in woodworking shops. The maple inlay adds an interesting touch of decoration but may be omitted if desired. This chest may be made with or without tray since it is a comparatively shallow model.

A natural finish is best suited to this project, especially if the maple inlay is used, as the striking contrast of maple and walnut is best brought out in this way.

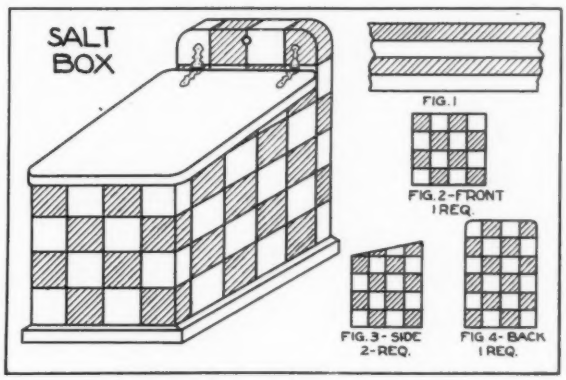
The cost of this chest is comparatively small, comparing favorably with most other projects in advanced woodwork. With a bit of skill and accuracy in construction the chest makes a beautiful as well as useful piece of furniture for the home.

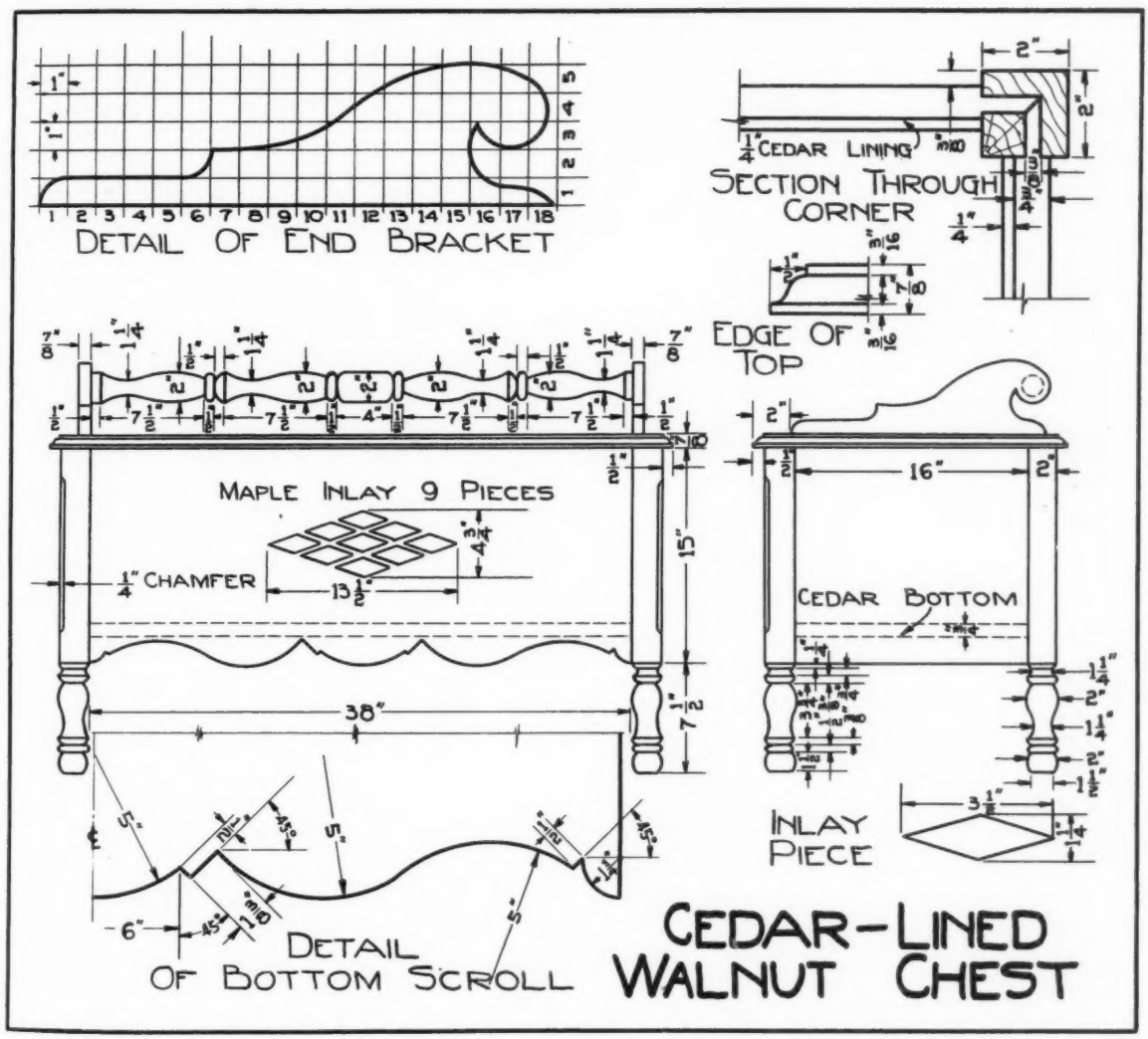
CHECKERBOARD SALT BOX

Ralph P. Hummell, High School, Washington, Pennsylvania

The salt box described herewith is a good project for accurate planing, fitting, and careful gluing.

It is made by gluing up, alternately, pieces of walnut and





poplar or maple, Figure 1. By cutting the resulting pieces at right angles to the parallel strip stock, narrow strips of squares are obtained. These are then glued up in the checkerboard style (see Figs. 2, 3, and 4).

The writer finds that it is best to glue up each section separately, taking care to fit each corner so that the points meet.

The box consists of one front piece checkerboard stock, 4 by 4 in. (Fig. 2), two side pieces, 5 by 4 in., planed as shown in Figure 3, one back, 6 by 4 in. (Fig. 4), one top with corners rounded to ½-in. radius. The bottom should be large enough to allow for a ⅛-in. chamfer. It should be made of poplar or walnut. The cover, which should be large enough to have a ⅛-in. overhang at the front and sides, is to be made of walnut, poplar, or checkerboard stock. Top and bottom are fitted after the four parts are glued and nailed (using a butt joint). One pair of fancy hinges ⅜ in. or ½ in. wide complete the construction. Sand thoroughly and shellac.

ETCHED BOOK ENDS

Gerald A. Boate, Seattle, Washington

The book ends described herewith require two sheets of No. 20, 3¾ by 10-in. brass. Select pieces that are free of scratches. Cut the sheets to the required shape, then smooth all edges, after which all surfaces should be polished with a liquid brass polish. After this has been done, be careful not to let the fingers touch any of the surfaces.

Carefully draw or trace the design to be used on a piece of white paper. Dust over one of the brass surfaces a thin even coating of white chalk. Put over it a piece of carbon paper and on top of this place the design. The brass and the carbon paper and the design may be held together with spring clothespins. Then, starting from the top, trace over every line of the design with a medium black, somewhat dull, lead pencil.

Next, paint in the design with asphaltum paint. The ordinary black stovepipe enamel, which sells for 10 cents a can, may be used. If the enamel is too thick, thin it, using either kerosene, turpentine, or one of the turpentine substitutes. All the parts of the design which show black in the picture are painted on with the enamel, using a small, round-pointed brush. All edges, the bottom, and the back must be painted so that the etching acid will not attack the metal. Next, let the enamel dry thoroughly hard.

The etching solution is made by adding commercial nitric acid to water. The greater the proportion of acid to water, the faster it will act upon metal, and the rougher will be the etching effect obtained.

To mix the etching solution, take an earthenware jar which is large enough to permit the two ends to be placed in at the same time. Fill it two-thirds full of water. Then slowly add about one fourth as much acid, stirring it carefully so as to prevent any spattering of the acid. If liquid soap or coconut-oil shampoo is rubbed over the hands and arms before starting to mix the acid, there will be no danger of getting any acid burns. Keep your face away from the etching fluid and do not inhale any of the fumes.

The book ends are not to be bent until they are etched. Tie two pieces of fine brass wire loosely around the book ends. Let the wire extend far enough so that the book ends can be pulled out of the etching fluid from time to time for inspection.

Lower the two book ends, top first, into the acid solution and allow them to remain for about 5 minutes. At that time fine bubbles should be forming on the bright parts. If they do not, remove the book ends and carefully stir in more nitric acid. Replace the book ends and leave them in the solution until the etching is approximately 1/32 in. deep. When the desired depth has been obtained, rinse the parts in cold, running water to wash off all of the acid.

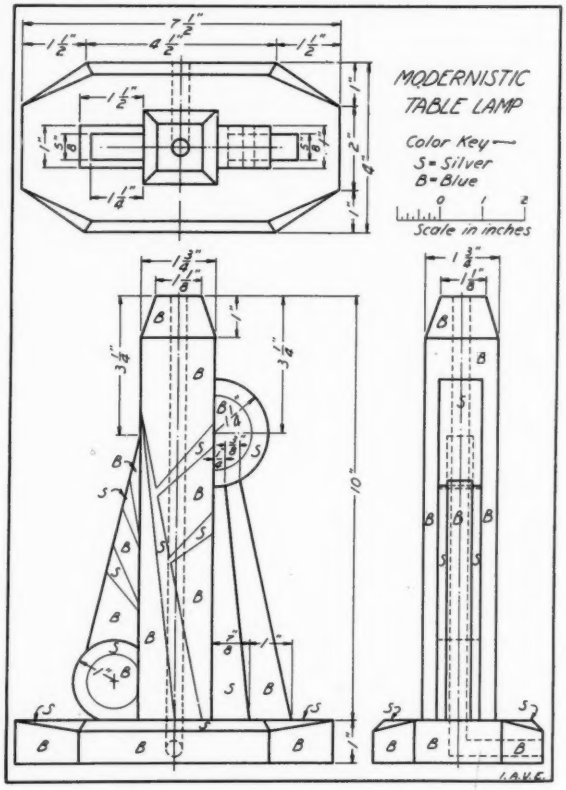
Next, place the book ends on top of some folded newspapers on the workbench, and with a wad of cloth swab the surfaces with kerosene until all of the black enamel has been washed off. Then wash with hot, soapy water. Next, bend the book ends to shape. This may be done in the vise, but the jaws should be protected with several thicknesses of cardboard to prevent them marring the brass. The book ends should be placed in the vise so that the etched surface is away from the operator. The metal should then be pulled gently back and downward. A piece of wood laid close to the vise jaws may be struck a few smart hammer blows in order to make the 90-deg. bend sharp and distinct.

The bottoms of the book ends should then be scraped with the edge of a dull knife, after which a piece of felt or leather should be glued to them with some of the iron glue that is obtainable at any 10 cent store. After the glue has dried, the book ends should again be polished, after which a coat of clear brushing lacquer, mixed with lacquer thinner in equal parts, may be brushed or sprayed on as a final finish.

A MODERN TABLE LAMP

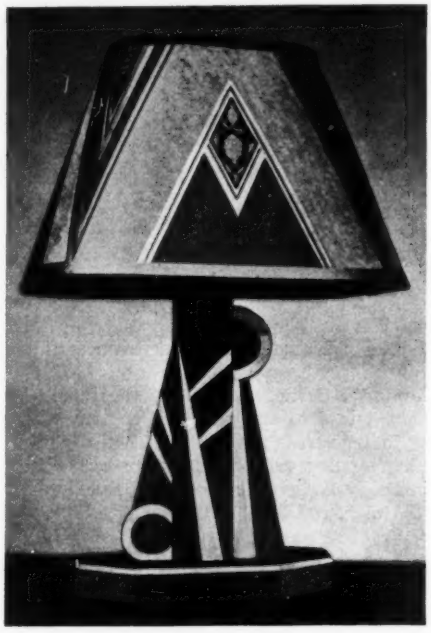
Jesse E. Rathbun, Union Grammar School, Carpinteria, California

The table lamp described herewith is a very popular as well as attractive project. The plan is sufficiently simple so that the pupil can grasp it readily, yet the construction presents an excellent problem for use in the school shop. It is particularly



well suited to junior-high-school pupils and advanced students in the grammar school.

The material may be any inexpensive wood, and it may be made of short odds and ends obtainable in most school shops.



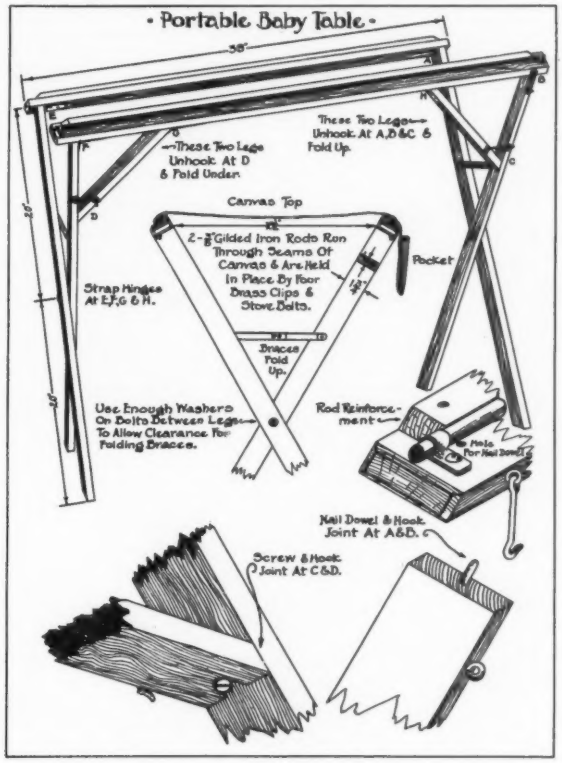
Modernistic table lamp

The color scheme given is only one of many possibilities. Much originality may be expressed in finishing the lamp. It presents a splendid opportunity to introduce varying color schemes to produce different effects.

PORTABLE BABY TABLE

Ken. F. Shepardson, La Crosse, Wisconsin

The portable baby table fills a need which any mother can appreciate. The table can be folded up and set up against the wall out of the way or taken apart and folded up when being moved from place to place. The canvas top can be readily removed for cleaning. The canvas pockets keep soap, powders, safety pins, etc., in an accessible place. Any soft wood, ¾ by 2 in., is sufficiently strong for construction of the frame. Complete material should not exceed $1.25. This includes the lacquer for finishing.


• Portable Baby Table •
36"
These Two Legs Unhook At A,D&C & Fold Up.
These Two Legs Unhook At D & Fold Under
Canvas Top
2-⅜" Gilded Iron Rods Run Through Seams Of Canvas & Are Held In Place By Four Brass Clips & Stove Bolts.
Pocket
Strap Hinges At E,F,G & H.
Braces Fold Up.
Use Enough Washers On Bolts Between Legs To Allow Clearance For Folding Braces.
Rod Reinforcement
Hole For Nail Dowel
Nail Dowel & Hook Joint At A&D.
Screw & Hook Joint At C&D.

Portable Baby Table

Associations, Conventions

ILLINOIS VOCATIONAL ASSOCIATION CONVENTION

The Illinois Vocational Association held its convention at Chicago, Ill., November 3 and 4, 1933. The programs for the general and sectional meetings were well planned. The attendance was very good.

Some of the outstanding addresses given may be credited to Wm. J. Bogan, superintendent of schools, Chicago; Dr. Wm. E. Warner, associate professor industrial-arts education, Ohio State University, Columbus; Prof. A. B. Mays, professor of industrial-arts education, University of Illinois; J. L. Lease, director of vocational education, Thornton Twp. High School, Harvey, Ill.; R. L. Sandwick, principal, Deerfield-Shields Twp. High School, Highland Park, Ill.; A. L. Slette, Twp. High School, Joliet, Ill.; C. E. Swanson, High School, Moline, Illinois; Wilbur Westoff, Peoria, Ill.; Harry R. Jackson, Eastern Illinois State Teachers College, Charleston; Verlon P. Ferguson, Oak Park, Ill.; Prof. Randolph P. Hoelscher, University of Illinois; Albert E. Peterson, Commonwealth Edison Co., Chicago; and Prof. Louis L. Thurstone, The University of Chicago.

After the general drafting session Saturday afternoon, the drawing teachers organized the Illinois Drafting Research Division, in order to carry on a continuous coöperative study of their common problems. Mr. H. D. Campbell, J. Sterling Morton Township High School, Cicero, Ill., was elected chairman of this research group.

The officers of the Illinois Vocational Association elected for the coming year are: President, N. F. Fultz, vocational director, J. Sterling Morton Township High School, Cicero; vice-president, Ernest J. Simon, High School, Champaign, Ill.; secretary, H. O. Myers, superintendent technical work, Tilden Technical High School, Chicago; and treasurer, L. J. Lease, vocational director, Thornton Township High School, Harvey, Ill.

MONTANA TEACHERS MEET

The industrial-education section of the northcentral district of the Montana Education Association held their annual meeting October 27 to 29, at Havre, in connection with the regular state teachers' association convention.

The sectional meeting took up the problems confronting the shop teachers throughout the state. At an informal breakfast, a round-table discussion emphasized the need for a stronger state-wide organization.

The following officers were elected for the year 1933–34: President, Mason Wynne, Great Falls; vice-president, E. L. Bergen, Great Falls; secretary, W. J. Micheels, Shelby. — *William J. Micheels.*

CONNECTICUT INDUSTRIAL-ARTS TEACHERS COMBINE ASSOCIATIONS

For nine years, efforts have been made to establish the industrial-arts teachers in a position of recognized strength in Connecticut. During that time, three separate organizations have been in operation, but efforts to form a state organization met with difficulties which delayed the solidarity necessary for unified action.

At a luncheon meeting, held on October 28, in New Haven, the way was cleared for the organization of a state association of industrial-arts teachers. At this meeting it was voted that the Industrial and Practical-Arts Association, the Central Industrial-Arts Association, and the New Haven Industrial-Arts Association be combined and carried on as units of a state association to be known as the Connecticut Industrial-Arts Association. Each unit of the state association will hold quarterly sectional meetings and will meet twice each year as a state body.

ARTHUR FEUERSTEIN
President Connecticut Industrial-Arts Association

The officers of the association will meet on November 17, at Bristol, to draw up a constitution and to make plans for strengthening the new organization.

The officers elected for the year 1933–34 are: President, Arthur Feuerstein, Stamford; vice-president, William F. Moran, Waterbury; secretary, Harry Barnicle, Hartford; treasurer, George A. Duncan, New Britain.

WISCONSIN INDUSTRIAL-ARTS ASSOCIATION MEETS

The Wisconsin Industrial-Arts Association held its annual meeting in connection with the Wisconsin Teachers' Association convention on Thursday, November 2, 1933.

Dr. Homer J. Smith, Professor Industrial Education, University of Minnesota, was the principal speaker. He chose for his topic, "Some Beliefs Concerning Industrial Arts." His address appears on page 3 of this issue.

Mr. J. F. Waddell, State High-School Supervisor, Madison, Wis., reported on the Regional Conferences that had been held in various sections of the state.

Mr. H. J. Shufelt, Supervisor Industrial Arts, Racine, Wis., as chairman of the Curriculum Committee of the Wisconsin Industrial-Arts Association, presented some mimeographed material which showed how enthusiastically the shop teachers of Wisconsin are attacking this vital problem.

The officers for the coming year elected at this time follow: President, Roy R. Van Duzee, Supervisor Industrial Arts, West Allis, Wis.; vice-president, V. M. Russell, State Teachers College, Platteville, Wis.; secretary-treasurer, Roy Radtke, Assistant in Industrial Arts, Public Schools, Milwaukee, Wis. Mr. H. J. Shufelt, supervisor industrial arts, Public Schools, Racine, Wis., was elected committeeman-at-large.

OFFICERS OF WISCONSIN VOCATIONAL ASSOCIATION

The Wisconsin Vocational Association, at its last meeting, elected the following officers and members of the executive committee for the year 1933–34:

President, West Burdick, Madison; secretary-treasurer, Jacob Spies, Sheboygan; vice-presidents, R. B. Locke, Omro; Genevieve Cox, La Crosse; Grace Kelly, Milwaukee; O. B. Lindholm, Waukesha; Grace Calkins, Eau Claire; Elsie M. Lund, Beloit; Charles Beardsley, Madison; R. L. Welch, Madison; and Henry Pomerenck, Madison.

NORTHERN ILLINOIS ROUND TABLE FOR INDUSTRIAL-ARTS TEACHERS

Thirty teachers of industrial arts and vocational education met on Tuesday evening, October 31, at the Northern Illinois Teachers' College, to form the Northern Illinois Industrial-Arts Round Table. The meeting was called by Mr. Milo T. Oakland, head of the industrial-arts department at the DeKalb School.

Mr. Drew W. Castle, president of the Illinois Vocational Association, talked to the group on the subject, "What is Going on in Industrial Arts."

The next meeting will be held at an early date and will be arranged by Robert Shumway, of Rockford, Drew W. Castle, of Joliet, and Milo T. Oakland, DeKalb.

ILLINOIS VALLEY INDUSTRIAL-EDUCATION CLUB

The monthly dinner meeting of the Illinois Valley Industrial Education Club was held at Peoria, Ill., on November 13. About 35 members and guests, representing the Peoria city schools, Bradley Institute, Manual Arts Press, and the towns of Pekin, Elmwood, and Galesburg, were present.

Superintendent Smith, of Pekin, in his subject, "The Purpose of the Junior High School," showed that industrial-arts work in the junior high school should be exploratory in character and should develop a reasonable degree of skill and ability in the use of tools.

Mr. Paul Waugh, of the Roosevelt Junior High School, Peoria, explained that while many schools change shops every ten weeks, the plan at Roosevelt Junior High School is to change every semester. Four types of work are being offered in his school: electricity, metal working, drawing, and woodworking.

Mr. W. Westhoff, an instructor in the Peoria High School, reported on the Illinois Vocational Association meeting, held in Chicago, on November 5 and 6, at which he delivered a paper on "The Use of Foreign Woods."

Mr. L. P. Elliott, supervisor of industrial education in Peoria, told of interviews with other teachers of the state. He mentioned that the Illinois Vocational Association convention will be held downstate next year for the first time since its organization. — *F. L. Barloga.*

NOVEMBER MEETING OF PITTSBURGH BRANCH OF TRADE AND INDUSTRIAL-EDUCATION ASSOCIATION

The November meeting of the Pittsburgh branch of the Trade and Industrial-Education Association was held on Wednesday, November 5, in Webster Hall, Pittsburgh, Pa. Charles W. Thomas, president, presided. More than a hundred members were present.

Dr. Ben Graham, superintendent of schools of Pittsburgh, introduced Hon. Clyde Kelly, representative of the thirty-third district in Congress, who gave a talk on the National Recovery Act.

Guests of the evening were Mrs. Mary J. Cowley, of the board of education of Pittsburg, Dr. Ben Graham, superintendent of schools, and Mr. C. B. Kistler, principal of the Westinghouse High School. — *James S. Dodds.*